



AEI Consultants

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CORRECTIVE MEASURES IMPLEMENTATION CLOSURE REPORT: Soil Remedy for Former Production Area (Lot 1102)

Property Identification:

BASF Former Ciba-Geigy Facility
200 Mill Street
Cranston, Rhode Island
AEI Project No. 363655

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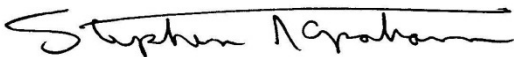
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LIST OF ABBREVIATIONS

AOC	Area of Concern
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
COC	Chemical of Concern
CVOCs	Chlorinated Volatile Organic Compounds
DCA	Dichloroethane
DCE	Dichloroethene
DNAPL	Dense Non-Aqueous Phase Liquid
DPVE	Dual Phase Vapor Extraction
HI	Hazard Index
HQ	Hazard Quotient
ILCR	Incremental Lifetime Cancer Risk
ISCO	In Situ Chemical Oxidation
MCL	Maximum Contaminant Level
MPS	Media Protection Standard
mg/L	milligram per liter
mg/kg	milligram per kilogram
µg/L	microgram per liter
MNA	Monitored Natural Attenuation
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
RIDEM	Rhode Island Department of Environmental Monitoring
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SRI	Supplemental Remedial Investigation
SVE	Soil Vapor Extraction
SWMU	Solid Waste Management Unit
TCA	Trichloroethane
TCE	Trichloroethene
TSCA	Toxic Substance Control Act
USEPA or EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds



EXECUTIVE SUMMARY

This Corrective Measures Implementation (CMI) Closure Report: Soil Remedy for the FPA (Lot 1102) fully documents the means and methods implemented to meet or exceed the conditions specified in the following regulatory approval documents:

- March 29, 2018 - Rhode Island Department of Environmental Protection (RIDEM) letter to BASF: **Concurrence with the Corrective Measures Implementation Plan Soil Remediation and Capping Lot 1102 Vol I and Vol II and Revisions.**
- June 19, 2018 - EPA letter to BASF: **PCB Risk-Based Disposal Approval Under 40 CFR Section 761.61(c), BASF Former Ciba-Geigy Facility – Lot 1102, 180 Mill St, Cranston, RI.**
- July 3, 2018 - EPA letter to BASF: **Response to Comments and Final Site Wide Remedy Decision for the BASF-former Ciba-Geigy Facility**

The July 3, 2018 EPA letter finalized the Statement of Basis (SOB) for the RCRA closure, where the SOB describes the project history, past remedial actions, and presents the proposed remedial alternatives for the closure project, which includes the following elements:

1. Former Production Area Soil
2. Former Production Area groundwater
3. Office, Warehouse and Laboratory Area Soil
4. Former Waste Water Treatment Plant Soil
5. Pawtuxet River Sediment.

This Corrective Measures Implementation (CMI) Closure Report is specific to Former Production Area (FPA) Soil. This report meets the requirements set forth in the June 19, 2018 EPA letter referenced above. The other elements have been or will be addressed in separate EPA submittals.

The Corrective Measures Implementation Plan, Soil Remedy for Former Production Area (Lot 1102) (CMIWP) (AEI, 2018) referenced above represents the remedial design for soil under a risk-based approach in accordance with the Toxic Substances Control Act (TSCA), 40 CFR 761.61 (c) and RIDEM's Remediation Regulations, DEM-DSR-01-93. The specific remediation goals and means and methods for PCB soil remedial action detailed in AEI (2018) are summarized below:

1. Removal and off-site disposal, at an approved facility, of all soil impacted with PCBs greater than or equal to 25 mg/kg, and, as necessary, additional soil with PCB content greater than or equal to 10 mg/kg, such that the resulting Exposure Point Concentration, as calculated by the 95% Upper Confidence Limit (UCL), is less than 10 mg/kg. This condition will be verified by implementing a TSCA-approved post-excavation verification sampling plan. This modification reduces off-site disposal requirements by an estimated 60%.
2. Within the FEMA Floodway, because capping and elevation increases are not permitted according to FEMA regulations, PCB-impacted soils ≥ 1 mg/kg will be removed and replaced with clean soil. Similarly, this < 1 mg/kg PCB condition will be verified by implementing a TSCA-approved post-excavation verification sampling plan.



3. After excavation is complete install a "clean soil cover" that encompasses all areas with in-situ soils containing PCBs ≥ 1 mg/kg, defined as follows (listed from cover bottom to top):
 - a. To limit the leaching potential of remaining soils containing ≥ 10 mg/kg PCBs and subject to infiltration from precipitation, cover subject soils with an impermeable high-density polyethylene (HDPE) cover material, except areas that are sequestered beneath existing concrete slabs.
 - b. To limit unapproved invasive activity and access to in-situ soils and to function as a cover boundary indicator, cover the entire area (except the sewer easement) with a permeable geotextile barrier.
 - c. To further limit the potential for direct contact of in-situ soils, apply a 2-foot layer of clean soil or equivalent (e.g., crushed stone may be used in areas where 2-feet of soil cannot be placed due to flood storage considerations, as in Floodway Zone AE per federal regulations), over the entire area to support landscaping alternatives, and as an additional engineered impediment to potential future unapproved invasive activity.
4. The surface of the subject property (Lot 1102) will be landscaped and vegetated to support a native upland habitat.
5. The PCB soil removal and clean soil cover eliminate the need for warning signage, because no soils containing >25 mg/kg PCBs will remain. Therefore, no signage will be installed along the periphery of the property after implementation of the remedy.
6. At a minimum, fencing will be installed along the river reach to limit river access, e.g., as a safety precaution. A security fence around the entire property is not proposed, though some form of fence demarcating the property boundary will be installed.
7. A long-term clean soil cover monitoring and maintenance plan will be developed for Agency review and subsequently implemented.
8. The remedial plan described above is intended to meet both TSCA and RIDEM Remedial Regulations, function as an impediment to unauthorized invasive activity and limit impact to groundwater. In addition, at a minimum, the clean soil cover will provide a substrate to support an enhanced upland habitat vegetation landscaping scheme. Finally, the remedy is intended to allow for potential future use of Lot 1102 as open space and parking, as will be defined in an ELUR to be filed with the property deed.
9. A PCB deed notice, required for any area where PCBs remain at ≥ 1 mg/kg, and an environmental land usage restriction required by the RIDEM and EPA, will be entered into as a joint document, if possible, and will be recorded on the deed as required by the EPA TSCA program and the RIDEM.

The approved remedy was implemented between August 6, 2018 and September 30, 2019. During remediation, modifications to the plan were required based on field data and feasibility considerations. These modifications to the plan were discussed with and approved by both the EPA and RIDEM. Implementation elements are summarized below:

- At initial mobilization, Site security (temporary chain link fence and locked gate) and safety measures (delineation of contamination and uncontaminated zones) were installed.
- During earthwork, an air monitoring program (continuous during work) was implemented, and dust suppression and vapor suppression were utilized, as needed.

- Excavation activities continued through December 2018 and involved the removal and off-site disposal of 5,327.6 tons of impacted soils.
- A TSCA-regulated post excavation program was implemented to verify compliance with the PCB cleanup metrics. It involved the collection of a total of 1,617 laboratory samples (1,799 with quality control) and 898 field screening samples (951 with quality control).
- Based on field conditions and feasibility considerations the following deviations from the CMIWP were derived through consultation with and approval by the EPA and RIDEM:
 - Area 1 – TP-5: To attain the remediation metrics, soil removal in this area was advanced to 15-feet bgs (approximately 10 feet below the water table) based on real-time verification sampling to the point where a dense silt/clay confining layer was encountered (consistent with the stratigraphic characterization in the CMS [AECOM 2016]). Based on feasibility and risk-based arguments, BASF requested to terminate this excavation at this depth.
 - Area 2 – Northeast Portion of the Floodway and Area 3 – North-central Site Excavation Area: These areas included subsurface concrete vaults which had been filled in with soil and demolition debris. The soil and debris was removed and the concrete structure was left in place and backfilled with imported clean material.
 - Floodway Areas: The MPS for soils within the floodway was modified to < 1mg/kg for soils 0 to 2 feet bgs and < 10 mg/kg PCBs at depths greater than or equal to 2 feet bgs.
- Following soil removal and verification of the cleanup metrics, the clean soil cover was installed.
- Finally, the area was landscaped and vegetated to stabilize the earthwork.
- On October 30, 2019 the soil remedy monitoring and maintenance plan (Clean Soil Cover Management Plan) was submitted to the EPA and RIDEM for review. The plan as well as a Soil Management Plan will be attachments to the deed notice/ELUR that establishes future property use restrictions and verification reporting requirements (**Attachments 3, 4 and 5**).

The calculated 95% UCLs for both the excavated and un-excavated data sets (representative of current, post-excavation conditions) are significantly less than the Media Protection Standard (MPS) established for the Site of 10 mg/kg PCBs (see **Appendices I and J**). Based on this evaluation, it is concluded that the soil remedial action objective for the Lot 1102 the (200 Mill Street) Site has been met and no further actions are necessary. The Site has been stabilized with new vegetation and an ELUR has been recorded with the property deed to restrict Site activities and use in perpetuity, as required by the approved CMI Work Plan. On September 30, 2019 EPA issued a Remedy Implemented declaration. Therefore, BASF concludes that the remedy for this Site has provided adequate protection of human health and the environment and has achieved a "Corrective Action Completion with Controls" status, in accordance with the RCRA Corrective Action program.

1.0 INTRODUCTION

1.1 Lot 1102 Soil Remedial Alternative: Selection and Definition

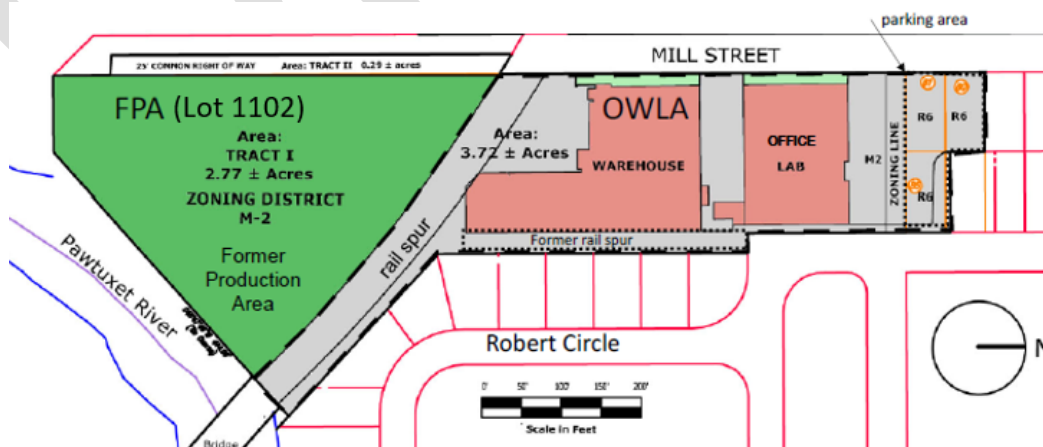
On May 25, 2016, the Environmental Protection Agency (EPA) issued a Statement of Basis (SOB) for the proposed remedy determination at the Former Ciba-Geigy Facility (Site) under the Resource Conservation and Recovery Act (RCRA) Corrective Action Program (RCRA Docket No. 1-88-1088, EPA ID No. RID001194323). The SOB is provided in Attachment 1, and it describes the project history, past remedial actions, and presents the proposed remedial alternatives under consideration. The SOB summarizes the results of various investigation and remediation activities and the reasons that the proposed remedial alternatives are appropriate. The SOB refers the reader to the administrative record, a compilation of EPA approved reports and work-plans, which contains more detailed information on site-specific activities. Specifically, the Corrective Measures Study (CMS) [AECOM, 2016] identifies the remedial alternatives that were evaluated and the reasons for their selection.

The SOB presents the five elements of the proposed corrective actions, specifically:

1. Former Production Area Soil
2. Former Production Area groundwater
3. Office, Warehouse and Laboratory Area Soil
4. Former Waste Water Treatment Plant Soil
5. Pawtuxet River Sediment.

This Corrective Measures Implementation (CMI) Closure Report is specific to Former Production Area (FPA) Soil. The other elements have been or will be addressed in separate EPA submittals.

The FPA is also referred to as Lot 1102, as per its designation on the City of Cranston tax map, Plat 4, with address 200 Mill St, Cranston, RI. The FPA is that parcel upon which Ciba-Geigy operated a chemical manufacturing facility from approximately 1953 to 1986 (the plant infrastructure was demolished in 1988). A Site Location Plan is presented as **Figure 1** and a Site Plan is presented as **Figure 2** (RCRA Site Overview).



Inset Figure A – Map showing the area associated with the FPA Soil remedy, also referred to as Lot 1102 herein.

The SOB was published to provide an opportunity for public review and comment on the proposal for the EPA to consider as part of its decision-making process. While EPA received many comments regarding the logistics of the remedy, there were no substantive comments that affected the basis for the proposed remedy, and as such the EPA considered the May 16, 2016 SOB to be final (see EPA letter of July 3, 2018: Response to Comments and Final Site Wide Remedy Decision for the BASF-former Ciba-Geigy Facility included as **Attachment 2**).

In 2009 BASF Corporation (BASF) incurred responsibility for the RCRA corrective action (RCRA Docket No. 1-88-1088, EPA ID No. RID001194323) through its acquisition of Ciba Specialty Chemicals Corporation, the successor to Ciba-Geigy Corporation. BASF completed a Supplemental Remedial Investigation (SRI) in 2016 (AECOM 2016) and the CMS in 2016 (AECOM 2016), which, as discussed in the SOB, formed the primary basis for the stated EPA decision.

This Corrective Measures Implementation (CMI) Closure Report: Soil Remedy for the FPA (Lot 1102) fully documents the means and methods implemented to meet or exceed the conditions specified in the following regulatory approval documents (included as Attachment 2):

- March 29, 2018 - Rhode Island Department of Environmental Protection (RIDEM) letter to BASF: **Concurrence with the Corrective Measures Implementation Plan Soil Remediation and Capping Lot 1102 Vol I and Vol II and Revisions.**
- June 19, 2018 - EPA letter to BASF: **PCB Risk-Based Disposal Approval Under 40 CFR Section 761.61(c), BASF Former Ciba-Geigy Facility – Lot 1102, 180 Mill St, Cranston, RI.**
- July 3, 2018 - EPA letter to BASF: **Response to Comments and Final Site Wide Remedy Decision for the BASF-former Ciba-Geigy Facility**

The Corrective Measures Implementation Work Plan, Soil Remedy for Former Production Area (Lot 1102) (CMI WP) (AEI, 2018) referenced above represents the remedial design for soil under a risk-based approach in accordance with the Toxic Substances Control Act (TSCA), 40 CFR 761.61 (c) and RIDEM's Remediation Regulations, DEM-DSR-01-93.

This design is intended to meet the following remedial action objectives:

- a. eliminate the potential for direct contact to impacted soil and groundwater; and
- b. eliminate the potential for contaminant of concern migration: PCBs in soil and groundwater, VOCs in groundwater.

To meet these objectives, a risk-based remedial approach under TSCA was presented in the CMI WP, and it was based on specific pre-design tasks detailed in the CMI WP and summarized below.

1.2 May 2017 Subsurface Investigation (AEI, 2017b)

Additional soil characterization data was collected as part of a test pitting program to provide further characterization of the nature and extent of PCBs in soils. In addition to resolving the horizontal and vertical extent of PCB impact site-wide, the sample results identified an area with elevated PCB concentrations in shallow soil in the southwest corner of the property not heretofore characterized (referred to in the CMI WP as the TP-5 Area).

1.3 April 2017 Groundwater Monitoring (AEI, 2017c)

As one of the objectives of the remedial action was to eliminate the potential for PCB migration as a dissolved phase in groundwater, the site-wide groundwater database was supplemented with a dedicated round of analysis for PCB aroclors and congeners. Three of these wells were selected due to their location near the TP-5 Area where high concentrations of PCBs were detected in shallow soil.

PCB Aroclors were detected in only 1 of the 12 monitoring wells sampled at a concentration greater than the EPA MCL of 0.5 µg/L (9 ug/L detected concentration), a shallow well adjacent to the TP-5 Area. This observed impact will be monitored following the completion of the soil remedy and reported under separate cover as part of the groundwater remedial action.

1.4 July 2017 Conceptual Site Model and Risk Evaluation (AEI, 2017a)

Based upon: 1) the results of the previous environmental investigations and remedial actions in the FPA, 2) a preliminary soil remedy design evaluation and 3) public comments on the proposed remedy, a refinement of the soil remedial approach was identified and presented in a conceptual site model/risk evaluation/preliminary design package submitted July 13, 2017 to EPA and RIDEM (presented in Appendix C of the CMI WP).

Specifically, the SOB described the following remediation metrics for FPA soil:

1. Removal and off-site disposal of all soil impacted with polychlorinated biphenyls (PCB) greater than or equal to 10 mg/kg. Verify that this metric is achieved by implementing an EPA-approved post-excavation verification sampling plan.
2. For remaining in-place soil that is impacted by PCBs above 1 mg/kg, cover with two feet of certified-clean soil, as per RIDEM regulations.

As detailed in the conceptual site model/risk evaluation/preliminary design, an equivalent set of remediation metrics, consistent with a TSCA risk-based approach, as allowed under 40 CFR 761.61(c), were proposed, wherein all soil impacted with PCBs greater than or equal to 25 mg/kg will be removed and additional PCB soil impact removed as necessary such that the post-excavation 95% upper confidence limit (UCL) of the mean PCB concentrations remaining is less than 10 mg/kg (i.e., a revised media protection standard for PCBs in soil was set at 25 mg/kg and a 95% UCL concentration of 10 mg/kg).

Based on the above analyses, the specific remediation goals and means and methods for PCB soil remedial action include:

1. Removal and off-site disposal, at an approved facility, of all soil impacted with PCBs greater than or equal to 25 mg/kg, and, as necessary, additional soil with PCB content greater than or equal to 10 mg/kg, such that the resulting Exposure Point Concentration, as calculated by the 95% Upper Confidence Limit (UCL), is less than 10 mg/kg. This condition will be verified by implementing a TSCA-approved post-excavation verification



sampling plan. This modification reduces off-site disposal requirements by an estimated 60%.

2. Within the FEMA Floodway, because capping and elevation increases are not permitted according to FEMA regulations, PCB-impacted soils ≥ 1 mg/kg will be removed and replaced with clean soil. Similarly, this < 1 mg/kg PCB condition will be verified by implementing a TSCA-approved post-excavation verification sampling plan.
3. After excavation is complete install a "clean soil cover" that encompasses all areas with in-situ soils containing PCBs ≥ 1 mg/kg, defined as follows (listed from cover bottom to top):
 - a. To limit the leaching potential of remaining soils containing ≥ 10 mg/kg PCBs and subject to infiltration from precipitation, cover subject soils with an impermeable high-density polyethylene (HDPE) cover material, except areas that are sequestered beneath existing concrete slabs.
 - b. To limit unapproved invasive activity and access to in-situ soils and to function as a cover boundary indicator, cover the entire area (except the sewer easement) with a permeable geotextile barrier.
 - c. To further limit the potential for direct contact of in-situ soils, apply a 2-foot layer of clean soil or equivalent (e.g., crushed stone may be used in areas where 2-feet of soil cannot be placed due to flood storage considerations, as in Floodway Zone AE per federal regulations), over the entire area to support landscaping alternatives, and as an additional engineered impediment to potential future unapproved invasive activity.
4. **These three combined elements: impermeable cover material, geotextile barrier and clean soil layer are referred to as a "clean soil cover" in this document.**
5. The surface of the subject property (Lot 1102) will be landscaped and vegetated to support a native upland habitat.
6. The PCB soil removal and clean soil cover eliminate the need for warning signage, because no soils containing > 25 mg/kg PCBs will remain. Therefore, no signage will be installed along the periphery of the property after implementation of the remedy.
7. At a minimum, fencing will be installed along the river reach to limit river access, e.g., as a safety precaution. A security fence around the entire property is not proposed, though some form of fence demarcating the property boundary will be installed.
8. A long-term clean soil cover monitoring and maintenance plan will be developed for Agency review and subsequently implemented.
9. The remedial plan described above is intended to meet both TSCA and RIDEM Remedial Regulations, function as an impediment to unauthorized invasive activity and limit impact to groundwater. In addition, at a minimum, the clean soil cover will provide a substrate to support an enhanced upland habitat vegetation landscaping scheme. Finally, the remedy is intended to allow for potential future use of Lot 1102 as open space and parking, as will be defined in an ELUR to be filed with the property deed.
10. A PCB deed notice, required for any area where PCBs remain at ≥ 1 mg/kg, and an environmental land usage restriction required by the RIDEM and EPA, will be entered into as a joint document, if possible, and will be recorded on the deed as required by the EPA TSCA program and the RIDEM.



BASF proposed this modified remedial design for the soil component of the remedy under a risk-based approach in accordance with TSCA, 40 CFR 761.61 (c) and RIDEM Remedial Regulations (CMI WP final dated April 30, 2019). USEPA/TSCA provided BASF approval of the modified risk-based approach on June 19, 2018. (**Attachment 2**).

Section 2 details the CMI WP scope of work and also presents further modifications to the plan based on field data, feasibility considerations, and eventual plan approvals by both the EPA and RIDEM.

2.0 SCOPE OF WORK

This Section details the implemented scope of work as defined in the CMI WP (AEI 2018), and it discusses specific modifications to the plan made apparent as necessary based on field data, feasibility considerations, and eventual plan approvals by both the EPA and RIDEM.

2.1 Chemicals of Concern

PCB soil impact grid sampling conducted during 2013/2014 supplemented the prior 1995 RFI data set and was intended to fully characterize the extent of the PCB impacts in Site soil. While it was believed that the majority of the PCB impacts had been characterized and remediated during a previous IRM in 1995, several pockets of shallow surface soil impacted by PCBs above the risk-based MPS were identified and discussed below.

Figure 5 presents the results of the SRI PCB soil analyses on Lot 1102 (AECOM, 2016a, Figure 9). These data indicate that there were 72 soil sample locations where PCB concentrations exceeded the MPS and required removal. The PCB soil analytical data tables, including samples which were excavated during the 1995 IRM, are presented in **Table 1**.

Additionally, based on soil data collected during the SRI (AECOM 2016), CMS (AECOM 2016), and PDI (AEI 2017a, 2017b, 2017c), Lot 1102 showed a shallow VOC mass of toluene and 2-chlorotoluene present in soils associated with SWMU-11 (historical toluene spill), and a shallow mass of xylenes in SWMU-8 (AECOM, 2016a). The VOC mass detected in SWMU-11 impacted the vadose zone soils (2-6 feet bgs) in the southwest corner of the former Building 11 footprint, where the SVE system was implemented from 1997 to 2005. The xylene impacted soils detected in SWMU-8 were present at 0-2 feet bgs.

2.2 Media Protection Standards

In accordance with the risk-based remedial approach and Site conceptual Site model/risk analysis, the following remedial objectives and media protection standards (MPS) for soil were derived from a combination of TSCA standards in 40 CFR 761 and RIDEM standards in the Remediation Regulations for soil compliance:

- ≥ 25 mg/kg PCBs: excavation and off-Site disposal to eliminate direct contact to impacted soil and meet the 95% UCL concentration of 10 mg/kg PCBs;
- ≥ 1 mg/kg and < 10 mg/kg PCBs: Emplace covering consisting of permeable geotextile and 2-feet of clean imported soil. The 2-foot clean soil cover eliminates the risk to humans of direct contact with impacted soil and thereby meets the requirements for the approved alternative TSCA risk-based closure under 40 CFR Part 761 (c).
- ≥ 10 mg/kg and < 25 mg/kg PCBs: below the clean soil cover, ensure placement of an impermeable cover to limit water infiltration from precipitation, which includes either existing in-situ concrete foundation slabs or in the absence of these structures the use of impermeable HDPE cover material. The impermeable cover addresses the RIDEM GB Leachability standard.



- Within the FEMA Floodway, because of restrictions on surface elevation increases, i.e., emplacing final cover material above the existing grade, PCB-impacted soils ≥ 1 mg/kg were removed and disposed off-Site and the excavations were backfilled to grade with clean soil.
- VOC-impacted vadose-zone soil associated with SWMU-11/former Building 11: Excavate soil to the water table, and before backfilling amend the top two feet of saturated zone soils with the oxidant catalyzed sodium persulfate in a mixing operation to address the potential for the presence of residual impact below the water table.

The above remedial strategy was implemented Site-wide, to the extent practical. During remedial action, implementation feasibility issues were realized in discrete areas, and as such, BASF submitted three CMI WP alteration requests (on October 17, November 14 and December 20, 2018) to EPA and RIDEM (see **Appendix A**). The requested alterations were as follows:

- Area 1 – TP-5: In this area, the remedial action goals were to achieve < 1 mg/kg PCBs within the floodway, and outside the floodway achieve < 10 mg/kg PCBs where able with a limit of < 25 mg/kg PCBs. Soil removal in this area was advanced to 15-feet bgs (approximately 10 feet below the water table) based on real-time verification sampling to the point where a dense silt/clay confining layer was encountered (consistent with the stratigraphic characterization in the CMS [AECOM 2016]). The concentrations of PCBs detected in four basal post excavation samples were 2.2, 3.7, 6.2 and 46.4 mg/kg at locations B-798-C, B-840-B, B-794-B and B-842-B, respectively. BASF requested terminating this excavation at its current depth based on feasibility and risk-based arguments. BASF also made a separate request to leave in place soils in the vicinity of sample ID B-826-B (11 mg/kg PCBs) due to its depth (13 ft bgs) and proximity to the concrete deadman for the sheet pile wall along the river.
- Area 2 – Northeast Portion of the Floodway: This area is within the floodway, therefore the remedial action goal was < 1 mg/kg PCBs. A portion of this area included an array of deep concrete basins or vaults that formerly contained large diameter piping with concrete walls and floors and which had been filled in with demolition debris. Due to the extensive quantity of concrete, debris and groundwater removal necessary to achieve compliance, BASF requested to remove soil/debris contained within the vaults, leave concrete in place and backfill the area with imported clean material.
- Area 3 – North-central Site Excavation Area: This location is not within the floodway, therefore the remedial action goals were to achieve < 25 mg/kg PCBs, and where able, < 10 mg/kg PCBs. This excavation encountered a subsurface concrete vault, and as with the other vaults encountered, this vault was filled with soil and demolition debris, and the concrete floor was located below the water table (the area refilled upon dewatering). Soil and debris contained within the vault were removed above the floor (located 10.5 feet bgs) and sidewall sampling indicated compliance with the MPS. Based on feasibility and risk-based arguments, it was recommended that the bottom concrete slab remain in place and the area filled with clean soil and capped with an impermeable liner.



- Other Floodway Areas: Alter the MPS within the floodway (outside of Area 1) to < 10 mg/kg PCBs at depths greater than or equal to 2 feet bgs.

The following is a summary of these approved deviations (documentation provided in **Appendix A**):

- Email correspondence *RE: Cranston - TP-5 Area Excavation Progress - APPROVAL to backfill*, dated October 23, 2018; USEPA/TSCA/RIDEM approved BASF's request to leave in-place PCB-impacted soils (< 13 mg/kg) within the FEMA floodway (TP-5 excavation) located behind a concrete deadman pinned to the riverway steel sheet piling. EPA will modify the PCB approval and stated the ELUR should clearly identify the area and depth where concentrations of PCBs will exceed the 1 mg/kg target and the closure report should include photo documentation, detailed figures and lab analytical results. Refer to Figures 2, 3 and 4 in the SMP, included as Attachment 4 which will be included as an Exhibit to the ELUR.
- Email correspondence *Re: [EXTERNAL]: RE: Former Ciba-Geigy, 180 Mill St, Cranston, RI - Request for CMI Work Plan Changes*, dated December 5, 2018; As discussed above, BASF submitted on December 4, 2018 three requests to alter the CMI WP due to site-specific conditions encountered. Three areas were noted within the request: 1) an area of the floodway adjacent to TP-5, 2) a northeastern section of the floodway, and 3) an excavation area outside the floodway located on the northcentral portion of the site. BASF presented post excavation sample data and final extents of excavations to support the rationale for terminating remedial operations in these areas and leaving soils impacted by PCBs above the site MPS in place. USEPA requested additional concrete data from deeper excavations, specifically those located in the floodway and the north-central section of the site to ensure no concrete left in place contained PCBs >25 mg/kg. Following sampling of very deep concrete (10+ feet bgs), BASF presented the data that demonstrated the maximum concentration in concrete was 3 mg/kg, well below the 10 mg/kg MPS. USEPA/TSCA/RIDEM approved the backfill of these requested areas without further sampling or concrete removal on December 5, 2019.
- Email correspondence *Re: Former Ciba-Geigy, 180 Mill Street, Cranston, RI - Weekly Project Status* dated January 28, 2019; USEPA/TSCA/RIDEM provided BASF approval to leave soil in-place (sample ID B-826-B – 11 mg/kg PCBs) due to its depth and proximity to the concrete dead-man for the sheet pile wall along the river and backfill the area. EPA modified the PCB approval and stated the ELUR should clearly identify the area and depth where concentrations of PCBs will exceed the 1 mg/kg target and the closure report should include photo documentation, detailed figures and lab analytical results. Refer to Figures 2, 3 and 4 in the SMP, included as Attachment 4 which will be included as an Exhibit to the ELUR.

2.3 Compliance with Media Protection Standards

For PCBs, a TSCA post-excavation verification sampling program was implemented following soil removal and prior to Site-wide backfill, i.e., 5-foot by 5-foot grid for both excavation bottom and sidewalls. The post soil removal sampling program was amended during remedial implementation,

as discussed below. Completion of corrective measures in soil was documented by comparing discrete sample residual concentrations of COCs in soil to the required MPS. If the maximum discrete PCB concentrations were less than the MPSs, then the corrective measure was considered complete.

PCB analysis was performed under an approved technical memorandum dated December 4, 2017 (revised May 16, 2018) that presented a summary of data collected to support the use of the PCB screening tool, Dexsil L2000DX PCB/Chloride analyzer, in conjunction with laboratory analysis via EPA Method 8082A/3540C Soxhlet Extraction. The technical memorandum included a comparability study of the screening tool versus fixed laboratory analysis of PCBs. The results of the study demonstrated:

- While on average the Dexsil overpredicted the actual concentrations, the screen was susceptible to underprediction within the 3 to 30 mg/kg PCB range;
- The correlation for concentrations > 10 mg/kg was excellent ($R^2 = 0.99$), however for concentrations ≤ 20 mg/kg the correlation was degraded;
- The correlation for concentrations < 10 mg/kg was marginal ($R^2 = 0.22$, however, the Dexsil was generally biased high.

Given these observations, the Dexsil screening method was approved by EPA for quantifying post excavation PCB concentrations to verify the site-wide clean metric with the use of a 2.0 multiplier for the Dexsil data to minimize possible false negatives. However, the planned frequency of Dexsil screening was decreased during the excavation process due to interfering compounds in the soil which created an increased reliance on laboratory analytical methods.

VOC-impacts, although comingled with PCB-impacted soils in SWMU-11 and SWMU-8, included separate sidewalls of the excavation (one per sidewall) and analyzed per EPA Method 8260C. VOC compliance was achieved when the soils from the unsaturated zone exhibited concentrations below the VOC MPS.

2.4 Technology Description

The objective of the soil remedial program was to address direct exposure to COCs in soils and to eliminate the potential for contaminant migration via air-born dust, surface water runoff (suspended solids and dissolved-phase) and dissolved-phase transport in groundwater. As described in Section 1.1, the chosen method to achieve compliance was excavation and off-Site disposal, at an approved facility, of soils impacted above the MPS, and subsequent covering of remaining impacted soils with a clean soil cover, followed by a land use restriction. The final remedial excavation plan was developed based on the approved CMI WP and real-time feasibility-related alterations derived with guidance and approval of the EPA and RIDEM (Appendix A). Refer to **Figure 4** for the PCB-soil excavation plan with pre-excavation non-clean sample locations.

Because the VOC-impacted soils were co-located with PCB-impacted soils, the remedial measure to address VOCs involved removal and disposal of these soils to remove the source VOC mass along with soils containing >25 but <50 ppm PCBs located in an approximate 20-foot by 30-foot area below former Building 11. Post soil removal, catalyzed sodium persulfate was pumped into the bottom of the excavation by Lockwood Remediation Technologies (LRT) of Leominster, MA



and SES, using an excavator, mechanically mixed the chemical into the saturated soils to treat the remaining vadose soils and underlying groundwater impacts as presented in the AECOM CMS (2016a). A total of 5,000 gallons of sodium persulfate was added to the soils.

2.4.1 Landscape Plan

The FEMA Floodway received backfill to grade using clean imported fill material. Outside the Floodway, plantings and other landscaping features were installed. The landscaping detail included in the CMI WP was dependent upon the final extents of the PCB-impacts and impermeable liner. Extensive PCB impacts both vertically and laterally increased the overall footprint of the impermeable liner, which required a change to the landscaping plan and details. A revised landscaping plan is illustrated in **Figure 5**, which follows similar design principles of the CMI WP, i.e., upland habitat and maintains the 2-foot clean soil cover over the demarcation geotextile fabric and impermeable layers. This revised landscaping plan required a modification to the existing RIDEM Wetlands Insignificant Alteration Permit, which was approved on July 24, 2019. Alterations to the original landscaping design included deleting shrubs and trees with deep root systems and replacing with shallow rooted plantings to prevent intrusion upon the impermeable liner.

3.0 PERMITS/REGULATORY APPROVALS

3.1 FEMA-Related

Portions of the Site are located in the restricted portion of the federal flood plain (denoted as Flood Zone AE and FEMA Floodway), as shown on **Figure 2**. FEMA limits raising the existing grade to one (1) foot above current grade in Zone AE, yet at least two (2) feet was needed to allow for the installation of the required two-foot clean soil cover. Therefore, BASF embarked upon demonstrating to FEMA that for Zone AE, using a FEMA-approved hydraulic modelling analysis, that the remedial work would not significantly decrease flood storage in a FEMA Map Revision process (revised in April 2017). BASF provided the hydraulic model and supporting documentation to FEMA in several correspondences as indicated below:

- March 30, 2018: entire FEMA application package uploaded to FEMA online LOMC portal, including: MT-2 Form 2 (Riverine Hydrology & Hydraulics form), raw HEC-RAS models and cHECK-RAS files, hydraulic analysis and supporting documentation demonstrating that changes to the base flood elevations of +/- 0.01 feet as modeled, Endangered Species Act (ESA) compliance with community official signatory, an annotated FIRM map and a Certified Topographic Workmap;
- June 29, 2018: Responded to received formal comments from FEMA dated 6-22-2018.
- July 19, 2018: FEMA responded with additional comments related to interpolated cross sections versus using LiDAR to prepare the entire cross sections, address missing cross sections not included on the work map (Cross Section 7692 spans the entire floodplain and add Cross Sections 7629 and 7598 to the work map), ensure the topwidths match for the floodway and 100-year floodplain at these cross sections and using the current interpolated cross sections, the water surface elevations are increasing for the base flood elevations (BFE) at those new cross sections; therefore, need draft property owner notification(s). A call was arranged between FEMA, AEI, BASF and GRA on July 24, 2018.
- July 24, 2018 teleconference call: FEMA acknowledged interpolation of cross sections is a valid method and did not require revisions to topographical work map. However, BFE increases required abutter notifications.
- July 25, 2018: BASF sent draft abutter notifications for FEMA review.
- July 30, 2018: FEMA responded to letters with a request to adjust floodplain delineations, specifically for Cross Sections 7938 and 7788, on topographical work map.
- July 31, 2018: BASF requested clarification on adjustments to floodplain delineations since revisions would narrow areas beyond those shown on the current FEMA model. FEMA acknowledged decrease and is in agreement with floodplain delineation adjustments. FEMA will review the abutter notifications after receiving revised topographical work map.
- August 2, 2018: BASF requested additional clarification for topwidth of Cross Section 7788. FEMA concurs.
- August 3, 2018: BASF resubmitted revised topographical work map to FEMA.
- August 7, 2018: FEMA acknowledged receipt of revised work map and issues revisions to abutter notifications.



- August 8, 2018: BASF resubmitted revised abutter notifications, topographical work map and annotated FIRM panels to FEMA.
- August 9, 2018: FEMA confirmed FEMA FIRM maps and abutter notification letters as acceptable. Approved sending of letters to abutters. FEMA noted, notifications must be sent by or on behalf of the affected communities. Therefore, either on community letterhead or a statement from the community official that: "all affected property owners have been notified of the floodway revision."
- August 10, 2018: BASF submitted minor modification to abutter notifications. FEMA concurred with modification. Notifications were issued the same day to abutters and to the Warwick community official.
- August 16, 2018: Warwick community official confirmed receipt of topographical work map, letters and emailed certification that these notifications had been issued.
- August 20, 2018: FEMA informed BASF that they are in receipt of all applicable information for the LOMR and are in process of approval.

The outcome was a Conditional Letter of Map Revision issued by FEMA on September 24, 2018.

3.2 RIDEM Wetlands-Related

On May 2, 2018 BASF completed a RIDEM Wetlands Insignificant Alteration Permit application to address the raising of the existing Site elevation within the 200-foot regulated flood plain. The technical documentation mirrored much of that specified above for the FEMA submittal, except for RIDEM-specific requirements such as a Soil Erosion and Sediment Control Plan (SESC). The RIDEM Insignificant Alteration Permit letter of May 11, 2018 was received, and it constituted both a Wetlands approval (18-0048) and an authorization under the *RIPDES General Permit for Stormwater Discharge Associated with Construction Activity* (Construction General Permit or CGP) – authorization No. RIR101724.

On July 9, 2019, to address modifications to the landscape plan discussed in **Section 2.4.1**, BASF submitted a revision to the Wetlands Insignificant Alteration Permit application. A RIDEM Insignificant Alteration Permit letter was received on July 24, 2019, and it constituted the Wetlands approval (18-0048) (See **Attachment 2**).

3.3 Other Permits

Digsafe, ticket #20183005820, was contacted by SES prior to the soil removal program.

No other permits were required to perform the soil remedial work.

4.0 SUMMARY OF WORK ACTIVITIES

4.1 TP-5 Soil Stockpile

A soil stockpile containing >50 mg/kg PCBs (discrete sample detected >100,000 mg/kg PCBs) was generated during a May 2017 limited subsurface investigation program (AEI, 2017b). Upon generation during the investigation program, the stockpile was underlain and covered by two layers of polyethylene sheeting and surrounded by haybales, awaiting off-Site transport to an approved TSCA-facility (Chemical Waste Management (CWM)-Emelle). The stockpile was managed until disposal approval and transport arrangements could be made.

On February 26, 2018, SES mobilized to the Site to load the soil stockpile into plastic-lined tractor trailers for off-Site transport. The soil stockpile was loaded into three (3) intermodal containers (IMCs) #22-4204, #22-3337, and #22-4170 by SES and shipped off-Site by Goulet Trucking of East Deerfield, MA to the Norfolk South Railway and ultimately to the CWM Facility in Emelle, AL. Uniform Hazardous Waste Manifests and Certificate of Disposal Letters from CWM are attached in **Appendix G**. About 41 cubic yards (25 tons) of PCB Remediation Waste material was loaded and transported off-Site.

The tractor trailers and IMCs were examined for residual soils and cleaned as necessary prior to exiting the Site. The tracks of the excavator were dry deconned over polyethylene sheeting, and the residual soil / polyethylene sheeting were placed under polyethylene sheeting, awaiting further processing and appropriate disposition during the upcoming remedial work. The small hand tools (i.e., shovels, scrapers) and the excavator bucket were wiped down with absorbent pads soaked in diesel fuel (an EPA-recommended PCB cleaning solvent). Used PPE and decontamination materials were consolidated into a 55-gallon drum on-Site, labeled as PCB containing material and secured over the asphalt awaiting final disposition. The drum contents were added to a rail car and disposed of as TSCA waste during the full PCB soil remediation program at the CWM facility in Emelle, AL.

4.2 Soil Remediation and Site Rehabilitation

Soil remediation activities were completed by SES with oversight provided by AEI. SES mobilized to the Site on August 6, 2018. Excavation activities commenced on August 15, 2018. SES was responsible for all construction activities including: implementation of worker health and safety measures; Site clearing and grubbing; monitoring well closure and extension; soil and debris excavation, management and off-Site disposal; importation and placement of clean fill material; soil compaction and grading; and Site restoration/landscaping. AEI was responsible for the collection and analysis of post-excavation soil samples; data handling and interpretation; revisions to the excavation and final cover plans, as needed, and construction quality assurance during the remediation process.

As requested by EPA, a series of soil borings to a depth of 2 feet around the perimeter of the Site where a "wedge" of soil was planned to be excavated to this maximum depth to "feather-in" the planned two-foot clean soil cover with the surrounding existing grades were completed to pre-characterize that soil prior to excavation. These borings (identified as W-1 through W-46) were completed at a spacing of 20 feet along the perimeter only where prior soil data had not been



previously collected, as shown on **Figure 3**. Based on the results of PCB testing, the soils excavated from the “wedge” along the Site perimeter to accommodate the 2 foot clean soil cap were either stockpiled on site for use as backfill for excavations (soils <10 ppm PCBs) or disposed off-site (soils ≥10 ppm PCBs). Where PCB concentrations were ≥10 ppm, additional soil samples were collected to confirm that the soils remaining in place contained <10 ppm of PCBs. The results of the wedge soil analyses are presented as “W” samples at the end of **Table 2**.

The table on the following pages summarizes the activities conducted during the Lot 1102 soil remedy as described in AEI’s daily project reports, which are included in **Appendix B**. Photographic documentation of the activities completed during the course of work are included in **Appendix C**.



DATE	WORK COMPLETED
7/12/2018 thru 7/16/2018	<ul style="list-style-type: none"> • Site clearing using brush hog and hand tools (e.g., weedwhacker, lopping shears) to prepare for site survey. • Decontaminated site clearing equipment using double-wash rinse method.
7/17/2018	<ul style="list-style-type: none"> • PCB wipe sample collected from decontaminated equipment.
7/23/2018 thru 7/24/2018	<ul style="list-style-type: none"> • Site survey to stake planned excavation locations.
8/6/2018	<ul style="list-style-type: none"> • Contractor mobilizes to site and installs erosion controls, secures job-site/security, installs RIDEM wetland signage and begins site clearing and grubbing. • AEI sets-up perimeter air monitors (4) around site and begins data logging. • Contractor and AEI conduct site walkthrough to assess project preparation needs on Lot 1102 and 2682 (BASF-owned property across street used for rail transport).
8/7/2018	<ul style="list-style-type: none"> • Contractor continues site clearing and grubbing. Cleared materials are stockpiled on-site awaiting offsite recycling.
8/8/2018	<ul style="list-style-type: none"> • Contractor continues site clearing and grubbing. Cleared materials are stockpiled on-site awaiting offsite recycling.
8/9/2018	<ul style="list-style-type: none"> • Contractor continues site clearing and grubbing. Cleared materials are stockpiled on-site awaiting offsite recycling. • Jeff Crawford (RIDEM OWM) onsite to overview the project.
8/10/2018	<ul style="list-style-type: none"> • Contractor continues site clearing and grubbing. Cleared materials are stockpiled on-site awaiting offsite recycling. • Finished construction of temporary snow fencing along boundary of property and adjacent Lot 2630 (privately owned). • Mobile fence company onsite to install temporary chain link fencing along Mill Street property boundary and entrance to rail on Lot 2682.
8/13/2018	<ul style="list-style-type: none"> • Contractor began removing permanent fence along Mill Street and clearing brush and trees from Lot 1102 asphalt area.

DATE	WORK COMPLETED
8/14/2018	<ul style="list-style-type: none"> • Contractor demarcated health and safety zones (e.g., support, contaminant reduction and hot zones). • Well driller onsite to begin closing permanent monitoring wells in accordance with RI requirements. • Began preparation of temporary soil stockpile area and rail loading zone on Lot 2682. • Prepared construction access road on Lot 1102 using geotextile fabric and crushed stone.
8/15/2018	<ul style="list-style-type: none"> • Contractor began soil removal, beginning in southwest corner of site, pre-characterized as non-TSCA. Soils stockpiled onsite. AEI collected samples for laboratory and field analyzer analysis. • Finished removal of Mill Street permanent fencing.
8/16/2018	<ul style="list-style-type: none"> • Constructed decontamination pads on Lots 1102 and 2682 using 20-mil HDPE, straw wattles and 1.5-inch crushed stone. • New England Geotech begins pre-characterization boring program for "wedge" soils. • Prepared temporary soil stockpile areas on Lot 1102. • Continued soil removal operations for non-TSCA soils. Began excavation of TSCA soils. Non-TSCA soils continued to be stockpiled on Lot 1102. TSCA soils transported via 18 cy roll-off to Lot 2682. AEI continued collection of post-excavation PCB soil samples.
8/17/2018	<ul style="list-style-type: none"> • Emplaced rubber matting in support zone where dump trailers were loaded to haul soils to the temporary soil stockpile areas onsite and to Lot 2682 (for rail transport). • Continued excavation of TSCA soils. • New England Geotech continues boring program. • Diprete (surveyor) onsite to survey excavation extents and topographical information.

DATE	WORK COMPLETED
8/20/2018	<ul style="list-style-type: none"> • Soil removal of TSCA soils continued with AEI collecting field samples. TSCA soils transported to Lot 2682 temporary soil stockpile area for future rail transport.
8/21/2018	<ul style="list-style-type: none"> • Soil removal of TSCA soils continued with AEI collecting field samples. TSCA soils transported to Lot 2682 temporary soil stockpile area for future rail transport. • Water from leaking hose infiltrated open excavation. Slow to negligible infiltration, so water had to be managed by contractor as TSCA-impacted. • Contractor identified hydraulic oil leaking from skid steer. Oil did not contact ground surface, only poly and road plates. Contractor fixed leak, cleaned spill using speedy dry and contained waste.
8/22/2018	<ul style="list-style-type: none"> • Soil removal of TSCA soils continued with AEI collecting field samples. TSCA soils transported to Lot 2682 temporary soil stockpile area for future rail transport.
8/23/2018	<ul style="list-style-type: none"> • Soil removal of TSCA soils continued with AEI collecting field samples. TSCA soils transported to Lot 2682 temporary soil stockpile area for future rail transport. Contractor began excavating TP-5 excavation area (PCB hot spot). Soils were transported to separate stockpile on Lot 2682.
8/24/2018	<ul style="list-style-type: none"> • Removal of TSCA soils continued with AEI collecting field samples. TSCA soils transported to Lot 2682 temporary soil stockpile area for future rail transport. Contractor continued excavating TP-5 excavation area (PCB hot spot). Soils were transported to separate stockpile on Lot 2682. • USEPA and BASF onsite to overview project. No issues noted by EPA during visit.



DATE	WORK COMPLETED
8/27/2018	<ul style="list-style-type: none"> Removal of TSCA soils continued with AEI collecting field samples. TSCA soils transported to Lot 2682 temporary soil stockpile area for future rail transport. Contractor identifies potential ACM (mastic) on construction debris comingled with soil. Contractor personnel, licensed to sample/handle ACM, collect one sample and submit for ACM analysis. Results indicate no ACM.
8/28/2018	<ul style="list-style-type: none"> Removal of TSCA soils continued with AEI collecting field samples. Concrete and drainage structure debris were comingled with soils. TSCA soils transported to Lot 2682 temporary soil stockpile area for future rail transport.
8/29/2018	<ul style="list-style-type: none"> Removal of TSCA soils continued with AEI collecting field samples. TSCA soils transported to Lot 2682 temporary soil stockpile area for future rail transport. Railcar liners received were rejected by contractor due to improper loading by transporter. New liners will be sent. Dewatering frac tank mobilized onsite. Frac tank contained water (rainwater) and equipment rental company (LRT) to be onsite tomorrow to pump residual water.
8/30/2018	<ul style="list-style-type: none"> Non-TSCA soils were excavated and temporary stockpiled onsite. AEI collected post excavation soil samples for field analyzer and laboratory analysis. Hoe ram mobilized to site to break-up concrete foundations and slabs. LRT onsite to pump rainwater from fractionation tank. Cleared vegetative material (no stumps) loaded into 70-cy dump trailer for offsite recycling at the G. Lopes facility in Raynham, MA.
8/31/2018	<ul style="list-style-type: none"> TSCA and non-TSCA soil removals continued. Excavated soils are separately stockpiled. Diprete onsite to survey site features and excavation extents/depths. Continued concrete hammering operations using hoe ram.
9/4/2018	<ul style="list-style-type: none"> Continued excavation of TSCA soils and transporting/stockpiling to Lot 2682 (rail). AEI collected post excavation PCB samples using screening tool and laboratory analysis. PCB wipe sample collected by contractor from 5-cy dump trailer in preparation for demobilization.



DATE	WORK COMPLETED
9/5/2018	<ul style="list-style-type: none"> Continued excavation of TSCA soils and transporting/stockpiling to Lot 2682 (rail). AEI collected post excavation PCB samples using screening tool and laboratory analysis. Final preparation of rail loading area on Lot 2682. Began lining and loading two railcars with TSCA soils. Contractor collects waste characterization sample from SWMU-11 soils. AEI safety officer onsite to conduct H&S audit.
9/6/2018	<ul style="list-style-type: none"> Continued excavation of TSCA and non-TSCA soils and transporting/stockpiling to Lot 2682 (rail) and/or Lot 1102. AEI collected post excavation PCB samples using screening tool and laboratory analysis. Two railcars containing TSCA soils were transported offsite by P&W Railroad under Uniform Hazardous Waste manifests.
9/7/2018	<ul style="list-style-type: none"> Continued excavation of TSCA and non-TSCA soils and transporting/stockpiling to Lot 2682 (rail) and/or Lot 1102. AEI collected post excavation PCB samples using screening tool and laboratory analysis. Two new railcars received and were lined and loaded with TSCA soils. Awaiting offsite transport via P&W.
9/10/2018	<ul style="list-style-type: none"> Excavated non-TSCA soils from floodway. Encountered numerous concrete structures, which required removal using hoe ram to achieve target depth. Contractor revisiting (redig) excavations that were non-compliant with site cleanup criteria. AEI recollected PCB samples. AEI informed contractor that perched water encountered in excavations that must be removed in order to advance excavations must be managed as PCB-impacted and cannot be re-infiltrated unless tested and demonstrating compliance with TSCA unrestricted use criteria.

DATE	WORK COMPLETED
9/11/2018	<ul style="list-style-type: none"> Continued redigging of non-compliant areas (TSCA soils). AEI recollected post excavation PCB samples for analysis. Two lined railcars containing TSCA soils transported offsite under Uniform Hazardous Waste manifest. Two new railcars delivered, lined and loaded with TSCA soils. Contractor setting up frac tank in preparation for dewatering operations tomorrow. NEG onsite to close 20 monitoring wells: MW-20S, MW-10S, MW-10D, P-13D, P-38S, P-3S, P-37S, P-32D, P-32S, P-001S, P-36S, PW-130, P-35S, P-33D, P-33S, RC-2, P-34S, P-4S, P-5S and MW-14D.
9/12/2018	<ul style="list-style-type: none"> Continued redigging of non-compliant areas (TSCA soils). AEI recollected post excavation PCB samples for analysis. NEG onsite to close 6 monitoring wells: P-30D, PW-110, MW-21S, VE-4, VE-5, VE-6, and VE-8.
9/13/2018	<ul style="list-style-type: none"> Continued redigging of non-compliant areas (TSCA soils). AEI recollected post excavation PCB samples for analysis. Diprete onsite to conduct as-built survey. Cast iron piping removed from excavations reduced in size by hoe ram. Continued clearing and grubbing trees/shrubs around site. Cleared debris (no stumps) transported offsite to the G. Lopes facility in Raynham, MA.
9/14/2018	<ul style="list-style-type: none"> Decontamination of equipment (rock truck, two excavators). Wipe samples collected prior to demobilization. Continued clearing and grubbing trees/shrubs around site. Cleared material transported offsite to the G. Lopes facility in Raynham, MA. Grubbed material added to TSCA waste stream. Excavation of non-TSCA soils. Notable large quantity of debris comingled with soil. AEI collected post excavation samples for PCB analysis. Lined and loaded three new railcars with TSCA soils. Two railcars containing TSCA soils transported offsite to the CWM facility in Emelle, AL. Improvements made to fence line safety signage.

DATE	WORK COMPLETED
9/17/2018	<ul style="list-style-type: none"> • Dewatered excavations using 2-inch pumps and stored water in baffled fractionation (frac) tank. • Continued excavation of non-TSCA soils. AEI collected post excavation samples for PCB analysis. • Revisited excavations that were not compliant with the soil MPS. AEI recollected post excavation samples for PCB analysis.
9/18/2018	<ul style="list-style-type: none"> • Continued excavation of non-TSCA soils. AEI collected post excavation samples for PCB analysis. • Revisited excavations that were not compliant with the soil MPS. AEI recollected post excavation samples for PCB analysis. • Transported cleared debris offsite to the G. Lopes facility in Raynham, MA. • Structural engineer onsite to overview open excavations for compliance with OSHA Subpart P.
9/19/2018	<ul style="list-style-type: none"> • SES assisted AEI with collection of post excavation samples from deep (>3 feet bgs) excavations. • Consolidated TSCA soil stockpiles. Expanded footprint of non-TSCA soil stockpile area. • Lined and loaded three railcars with TSCA soils for transport offsite to the CWM facility in Emelle, AL.
9/20/2018	<ul style="list-style-type: none"> • Revisited excavations that were not compliant with the soil MPS. AEI recollected post excavation samples for PCB analysis. • Dewatered excavations using 2-inch pumps to advance excavations to target depths. Water stored in onsite frac tanks. • Diprete onsite to survey as-built conditions. • Conducted a soil erosion and sediment control (SESC) plan inspection.
9/21/2018	<ul style="list-style-type: none"> • Continued excavation of non-TSCA soils. AEI collected post excavation samples for PCB analysis. • Three railcars transported offsite to the CWM facility in Emelle, AL. Three new railcars received.
9/24/2018	<ul style="list-style-type: none"> • Continued excavation of non-TSCA soils. AEI collected post excavation samples for PCB analysis. • Three railcars transported offsite to the CWM facility in Emelle, AL. • Diprete onsite to resurvey excavation layout locations and stake new excavation locations.

DATE	WORK COMPLETED
9/25/2018	<ul style="list-style-type: none"> Continued excavation of non-TSCA soils. AEI collected post excavation samples for PCB analysis. Revisited excavations that were not compliant with the soil MPS. AEI recollected post excavation samples for PCB analysis. Backfilled compliant excavations with the soil stockpiled from the Lot 2630 project work. Three railcars shipped offsite to the CWM facility in Emelle, AL. Three new railcars received.
9/26/2018	<ul style="list-style-type: none"> Thielsch Engineering onsite to conduct in-place density testing (compaction). Lined and loaded three railcars with TSCA soils. Conducted a SESC inspection. Continued excavation of non-TSCA soils. Numerous concrete structures encountered before reaching target depth. AEI collected post excavation samples for PCB analysis.
9/27/2018	<ul style="list-style-type: none"> Diprete onsite to survey as-built conditions. Removed TSCA and non-TSCA soils. AEI collected post excavation samples for PCB analysis. Excavation included soils contained within the "wedge" cut, which were non-compliant with the MPS and required offsite disposal. An additional 10,000-gallon frac tank received to manage groundwater removed from excavations. Excavated soils impacted by VOCs (xylenes) from SWMU-8 area. Soils were stockpiled separately from TSCA soils. AEI collected post excavation samples for VOCs.
9/28/2018	<ul style="list-style-type: none"> AEI collected post excavation soil samples from the area impacted by VOCs. Continued excavation of non-TSCA soils. AEI collected post excavation samples for PCB analysis. Backfilled compliant excavations using Lot 2630 soils. Compacted soils using excavator bucket. Three railcars containing TSCA soils shipped offsite to the CWM facility in Emelle, AL. Three new railcars received.

DATE	WORK COMPLETED
10/1/2018	<ul style="list-style-type: none"> • Conducted seven test pits in northeast section of floodway to analyze soils for compliance to the RIDEM residential soil standards and TSCA unrestricted use criteria. Four test pits could not be advanced due to shallow concrete. Remobilized a drilling crew to complete soil borings to target depth. • Continued backfill of compliant excavations using Lot 2630 soils. Compacted using excavator bucket. • Conducted a SESC inspection. • Began treating the stored groundwater using microfiltration. Collected water sample for PCB analysis.
10/2/2018	<ul style="list-style-type: none"> • Revisited excavations that were not compliant with the soil MPS. AEI recollected post excavation samples for PCB analysis. • Continued backfill of compliant excavations using Lot 2630 soils and imported Common Borrow. Compacted using excavator bucket. • Excavated TSCA soils. AEI collected post excavation soil samples for PCB analysis. • Began cutting the "wedge" along the property boundary to allow for installation of the 2-foot cap flush with the adjacent existing grade. Utilized removed compliant material for on-site excavation backfill. • Lined and loaded three railcars with TSCA soils. Three railcars shipped offsite to the CWM facility in Emelle, AL. • Thielsch Engineering onsite to perform in-place density testing of compacted backfill.
10/3/2018	<ul style="list-style-type: none"> • Began loading tri-axle trucks with non-TSCA soils designated for disposal to the Rhode Island Resource Recovery Conservation (RIRRC) facility in Johnston, RI. • Continued excavation of TSCA soils. Encountered groundwater, which needed to be managed with pumps/frac tanks before proceeding to target depth. AEI collected post excavation samples for PCB analysis, where available. • Finished lining and loading railcars with TSCA soils.

DATE	WORK COMPLETED
10/4/2018	<ul style="list-style-type: none"> • Began loading tri-axle trucks with non-TSCA soils designated for disposal to the RIRRC facility in Johnston, RI. • Mobilized additional groundwater management equipment, i.e., fractionation tanks and carbonation system for treatment. • Continued excavation of TSCA soils. AEI collected post excavation samples for PCB analysis, where available. • Delivery of Common Borrow to backfill compliant excavations. • Conducted a SESC inspection. • Diprete onsite to survey as-built conditions.
10/5/2018	<ul style="list-style-type: none"> • Continued loading tri-axes with non-TSCA soils for transport to RIRRC in Johnston, RI. • Imported Common Borrow to continue backfill of compliant excavations. • Mobilized a 20,000-gallon frac tank as storage for the treated groundwater. Test results from trial run of groundwater treatment through microfiltration/carbon system demonstrated PCBs <0.5 ug/L (0.433 ug/L). • Continued excavation of non-TSCA soils. AEI collected post excavation soil samples. Excavation included soils contained within the "wedge" cut, which were non-compliant with the MPS and required offsite disposal. • Backfilled compliant excavations with Common Borrow or onsite material containing < 10 mg/kg PCBs and compacted with excavator bucket. • Transported three railcars containing TSCA soils offsite to the CWM facility in Emelle, AL. Three new railcars delivered.
10/8/2018	<ul style="list-style-type: none"> • Lined and loaded three railcars with TSCA soils. • Continued "wedge" cut around site. Utilized removed compliant soils as on-site backfill in excavations. • Backfill using Common Borrow of compliant excavations continued. Compaction using excavator bucket. • New England Geotech onsite to advance four locations, previously not able to be test pitted due to shallow concrete, in the northeast floodway to analyze soils to determine compliance with RIDEM residential standards.

DATE	WORK COMPLETED
10/9/2018	<ul style="list-style-type: none"> • Dewatered two excavations (TP-5 and SWMU-8). Water was treated using carbon/filtration system and stored in 20,000-gallon frac tank. • Imported stone to create sump for deep TP-5 excavation. • Continued wedge cut. Removed compliant soils used for excavation backfill. • AEI collected post excavation samples from both non-TSCA and TSCA excavations. • Transported three railcars offsite to CWM facility in Emelle, AL. Three new railcars received.
10/10/2018	<ul style="list-style-type: none"> • JP Noonan transported treated groundwater to the Global facility in Taunton, MA. • Continued dewatering excavations to advance to target depth. Removed groundwater treated through filtration/carbon system and stored in frac tanks. • Excavated non-TSCA soils. AEI collected post excavation samples for PCB analysis.
10/11/2018	<ul style="list-style-type: none"> • JP Noonan transported treated groundwater to the Global facility in Taunton, MA. • Continued dewatering excavations to advance to target depth. Removed groundwater treated through filtration/carbon system and stored in frac tanks. • Excavated non-TSCA soils. AEI collected post excavation samples for PCB analysis. Excavation included soils contained within the "wedge" cut, which were non-compliant with the MPS and required offsite disposal. • Revisited non-compliant excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. • Conducted SESC inspection. • Diprete onsite to survey as-built conditions.
10/12/2018	<ul style="list-style-type: none"> • Revisited non-compliant excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. • Mobilized debris screener onsite.
10/15/2018	<ul style="list-style-type: none"> • Revisited non-compliant excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. • Lined and loaded three railcars with TSCA soils. • Conducted a SESC inspection. • Remobilized a replacement debris screener to the site. Prior screener was not operational.

DATE	WORK COMPLETED
10/16/2018	<ul style="list-style-type: none"> • Dewatered excavations in the floodway to allow for additional removal of soils above the MPS. • Excavated non-TSCA soils. AEI collected post excavation samples for PCB analysis. • Three railcars transported offsite to the CWM facility in Emelle, AL. Three new railcars received.
10/17/2018	<ul style="list-style-type: none"> • Dewatered excavations in the floodway to allow for additional removal of soils above the MPS. • Excavated non-TSCA soils. AEI collected post excavation samples for PCB analysis. Material with < 10 mg/kg PCBs were utilized as backfill in compliant excavations. • Cleared vegetative material transported offsite to the G. Lopes facility in Raynham, MA.
10/18/2018	<ul style="list-style-type: none"> • Revisited non-compliant excavations. Required dewatering to remove additional soils above the MPS. AEI collected post excavation samples for PCB analysis. • Continued backfill of compliant excavations using wedge soils (<10 ppm PCBs). Compacted using excavator bucket. • Transported treated groundwater offsite to the Global facility in Taunton, MA.
10/19/2018	<ul style="list-style-type: none"> • Dewatered excavations in the floodway to allow for additional removal of soils above the MPS. • Excavated non-TSCA soils. AEI collected post excavation samples for PCB analysis. Material with < 10 mg/kg PCBs were utilized as backfill in compliant excavations. • Completed a test pit within the former toluene release area, SWMU-11, for soil characterization.
10/22/2018	<ul style="list-style-type: none"> • Excavated non-TSCA soils. AEI collected post excavation samples for PCB analysis. • Conducted SESC inspection. • Excavated non-TSCA soils containing < 10 mg/kg PCBs, which were utilized as onsite backfill in compliant excavations. • Revisited non-compliant excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. • Dewatered excavations and stored water in frac tanks prior to treatment.

DATE	WORK COMPLETED
10/23/2018	<ul style="list-style-type: none"> • Transported non-TSCA soils to RIRRC in Johnston, RI. • Revisited non-compliant excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. • Dewatered excavations and stored water in frac tanks prior to treatment. • Continued excavation of < 10 mg/kg PCB soils and utilized material for backfill of compliant excavations. • Temporary fencing installed along the northwestern section of the site in preparation for large tree removal.
10/24/2018	<ul style="list-style-type: none"> • Transported non-TSCA soils and debris to RIRRC in Johnston, RI. • Screened non-TSCA soils through screener separating debris from soils. • Treated stored groundwater through filtration/carbon system. • Received 3-20,000-gallon frac tanks in preparation to advance TP-5 excavation deeper. • AEI collected post excavation samples for PCB analysis from excavations completed yesterday.
10/25/2018	<ul style="list-style-type: none"> • Transported non-TSCA soils and debris to RIRRC in Johnston, RI. • Screened non-TSCA soils through screener separating debris from soils. • Setup 3-20,000-gallon frac tanks in preparation to advance TP-5 excavation deeper. • BASF onsite to conduct field health and safety audit. • Diprete performing survey of as-built conditions.
10/26/2018	<ul style="list-style-type: none"> • Advanced TP-5 excavation deeper to remove non-compliant soils. Excavation dewatered and soils removed were stockpiled in TSCA area for future rail transport. Well PW-120 integrity was affected by depth of excavation and the upper screen and casing was removed by SES to allow for excavation to proceed deeper. The lower screened interval below the bottom of the excavation broke off and filled-in with the fine silty sand in the bottom of the excavation. • Water pre-treated and stored in frac tanks.

DATE	WORK COMPLETED
10/29/2018	<ul style="list-style-type: none"> Advanced TP-5 excavation deeper to remove non-compliant soils. Excavation dewatered and soils removed were stockpiled in TSCA area for future rail transport. AEI collected post excavation samples for PCB analysis. Water pre-treated and stored in frac tanks. Conducted a SESC inspection.
10/30/2018	<ul style="list-style-type: none"> Screened non-TSCA soils to separate debris from soil. Revisited non-compliant excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. Dewatered excavations and treated removed water through the filtration/carbon system. Imported Common Borrow to continue backfilling compliant excavations.
10/31/2018	<ul style="list-style-type: none"> Transported non-TSCA soil and debris to RIRRC in Johnston, RI. Dewatered excavations and advanced TSCA excavation to a concrete slab. Revisited excavations in floodway to achieve < 1 mg/kg PCB. Soils removed were utilized as onsite backfill material. Commenced excavation of SWMU-11 but work halted due to odors. Contractor mobilizing odor suppression equipment.
11/1/2018	<ul style="list-style-type: none"> Lined and loaded three railcars with TSCA soils. Dewatered non-TSCA excavation in floodway. Removed water was pre-treated and stored in onsite frac tanks. AEI collected post excavation samples for PCB analysis. Imported Common Borrow to backfill compliant excavations. Transported treated groundwater offsite to the Global facility in Taunton, MA. Attempted to hammer concrete slabs to advance excavations to target depth. Equipment inadequate to break large/thick concrete slabs. Remobilizing larger equipment. Diprete surveying as-built conditions.
11/2/2018	<ul style="list-style-type: none"> Transported treated groundwater offsite to the Global facility in Taunton, MA. Imported Common Borrow to backfill compliant excavations. Revisited floodway excavations to achieve < 1 mg/kg PCBs. Removed soils with <10 mg/kg PCBs utilized as onsite backfill. Treated groundwater through filtration/carbon system and stored in frac tank.

DATE	WORK COMPLETED
11/5/2018	<ul style="list-style-type: none"> • Transported treated groundwater offsite to the Global facility in Taunton, MA. • Transported non-TSCA soils and debris to RIRRC in Johnston, RI. • Revisited non-compliant excavations and removed additional soils above the MPS. • Revisited floodway excavations to achieve < 1 mg/kg PCBs. Removed soils with <10 mg/kg PCBs utilized as onsite backfill. • Three railcars containing TSCA soils to the CWM facility in Emelle, AL. Two new railcars received. • Conducted a SESC inspection.
11/6/2018	<ul style="list-style-type: none"> • Transported treated groundwater offsite to the Global facility in Taunton, MA. • Revisited non-compliant excavations and removed additional soils above the MPS. • Demolished concrete structures within "wedge" around property boundary that will affect emplacement of geotextile fabric. • Backfilled compliant excavations using < 10 mg/kg PCB soils excavated onsite.
11/7/2018	<ul style="list-style-type: none"> • Sizing stockpiled concrete to allow disposal as debris to RIRRC in Johnston, RI. • Treated groundwater through filtration/carbon system. • Imported Common Borrow used as backfill for compliant excavations. • Finished removing permanent fencing on the northwest side of the site. Fence added to metal recycling bin. • Dewatered excavations so AEI could collect post excavation samples for PCB analysis. • Removed additional soils from TP-5 sidewalls that were not compliant with MPS. AEI recollected post excavation samples for PCB analysis. • Conducted a SESC inspection.

DATE	WORK COMPLETED
11/8/2018	<ul style="list-style-type: none"> • Excavated VOC-impacted soils from SWMU-11. Removed soils to the top of water table, 6-feet bgs. Used odor suppressant and onsite personnel in Level C personal protective equipment. • Introduced 4,000 gallons of sodium persulfate catalyzed with sodium hydroxide to the base of SWMU-11 excavation. Solution mixed into saturated soils using excavator bucket. Following injection, excavation was backfilled using onsite soils containing < 10 mg/kg PCBs. • Continued "wedge" cut along property boundary. • CEC onsite to overview remediation progress and site area for ozone pilot test. • Treated groundwater through filtration/carbon system. Stored treated groundwater in frac tanks. • Lined and loaded one railcar with RCRA soils. • Thielsch Engineering onsite to conduct in-place density testing.
11/9/2018	<ul style="list-style-type: none"> • Revisited non-compliant excavations and removed additional soils above the MPS. AEI collected post excavation samples for PCB analysis. • Lined and loaded one railcar with TSCA soils. • Treated groundwater through filtration/carbon system. • Reduced concrete from wedge cut, in contact with < 10 mg/kg PCB soils, was utilized as backfill in compliant excavations. • Finished backfilling SWMU-11 with "wedge" cut soils and Common Borrow.

DATE	WORK COMPLETED
11/12/2018	<ul style="list-style-type: none"> • Transported treated groundwater offsite to the Global facility in Taunton, MA. • Cut concrete pad along northeast boundary of site using concrete saw. Concrete removed to allow for emplacement of 2-foot compliant soil cover flush with existing grade. • Dewatered floodway excavation and removed remaining debris from excavation until encountering concrete bottom. • Excavated < 10 mg/kg PCB soils and utilized as onsite backfill material. • Treated groundwater through filtration/carbon system. Treated groundwater stored in onsite frac tanks. • Conducted a SESC inspection.
11/13/2018	<ul style="list-style-type: none"> • Revisited non-complaint excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. • Imported Common Borrow and backfilled excavations in the floodway. Graded using the excavator bucket but limited compaction. • Treated groundwater through filtration/carbon system. Stored treated groundwater in onsite frac tanks. • Transported non-TSCA soil and debris offsite to RIRRC in Johnston, RI.
11/14/2018	<ul style="list-style-type: none"> • Revisited non-complaint excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. • Hammered non-compliant concrete for removal and recollected samples for PCB analysis. • Conducted SESC inspection. • Transported treated groundwater offsite to Global facility in Taunton, MA. • Moved fractionation tanks used to advance TP-5 excavation to decontamination area. • Imported Common Borrow.



DATE	WORK COMPLETED
11/15/2018	<ul style="list-style-type: none"> • Hammered non-compliant concrete and recollected samples for PCB analysis. • Transported treated groundwater offsite to Global facility in Taunton, MA. • Imported Common Borrow and backfilled floodway excavations. • New England Geotech onsite to close four monitoring wells: P-30D, VE-8, RC-1 and UNK-1. • Diprete surveyed as-built conditions. • Collected one sample of the proposed sand bedding for the installation of electrical conduit which will serve the ozone pilot test system
11/16/2018	<ul style="list-style-type: none"> • Excavated non-TSCA soils. AEI collected post excavation samples for PCB analysis. • Transported treated groundwater offsite to the Global facility in Taunton, MA. • Cut "wedge" along property boundary. Compliant soils removed utilized as onsite backfill. • Prepared area around large tree in northwest corner of property in preparation for tree cutting next week.
11/19/2018	<ul style="list-style-type: none"> • Setup decontamination equipment to decon 20,000-gallon frac tanks. Confined space entry (CSE) conducted by contractor under CSE permit. • Hammered concrete which was stockpiled for later offsite disposal. • Excavated < 10 mg/kg PCB soils from floodway and utilized as onsite backfill. • Conducted SESC inspection.



DATE	WORK COMPLETED
11/20/2018	<ul style="list-style-type: none"> • Setup decontamination equipment to decon 20,000-gallon frac tanks. Confined space entry (CSE) conducted by contractor under CSE permit. • Hammered concrete which was stockpiled for later offsite disposal. • Excavated < 10 mg/kg PCB soils from floodway and utilized as onsite backfill. • Transported non-TSCA soil and debris to RIRRC in Johnston, RI. • Treated groundwater through filtration/carbon system. Stored treated groundwater in onsite frac tanks. • Diprete surveyed as-built conditions. • Warwick Tree onsite to cut large tree. Equipment inadequate to remove tree. Remobilization planned for a later date.
11/21/2018	<ul style="list-style-type: none"> • Excavated non-TSCA soils. AEI collected post excavation samples for PCB analysis. • Transported non-TSCA soil and debris to RIRRC in Johnston, RI. • Revisited non-compliant excavations and removed additional soils. AEI recollected post excavation samples for PCB analysis. • Backfilled excavations using "wedge" cut soils and Common Borrow. Compacted using excavator bucket. • Transported treated groundwater offsite to the Global facility in Taunton, MA. • Decontaminated filtration/carbon system using double wash rinse method and solvent. Spent carbon added to TSCA soil waste stream for disposal at CWM facility.



DATE	WORK COMPLETED
11/26/2018	<ul style="list-style-type: none"> • Started Emplacement of impermeable liner. • Started emplacement of non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. • Conducted SESC inspection. • Moved construction entrance to northwest corner of the property along Mill Street. • Investigated alleged location of former 1,200-gallon septic tank. Brick structure located nearby location that did not contain liquid or solid material. Structure abandoned in place and backfilled with clean soils. • Excavated "wedge" cut along property boundary.
11/27/2018	<ul style="list-style-type: none"> • Emplaced impermeable liner. • Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. • Diprete surveying as-built conditions. • Conducted SESC inspection.
11/28/2018	<ul style="list-style-type: none"> • Emplaced impermeable liner. • Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. • Revisited excavations in floodway to achieve compliance with MPS. AEI collected post excavation samples for PCB analysis.
11/29/2018	<ul style="list-style-type: none"> • Hammered concrete in deep excavations for sampling (per EPA request in November 2018). Nine concrete samples collected and analyzed for PCBs. • Decontaminated hammer attachment using double wash rinse method. • Imported processed gravel. • Emplaced non-woven geotextile fabric and covered with processed gravel. • Cut "wedge" along property boundary.



DATE	WORK COMPLETED
11/30/2018	<ul style="list-style-type: none"> Excavated non-TSCA soils and live-loaded for direct transport to RIRRC in Johnston, RI. AEI collected post excavation samples for PCB analysis. Imported processed gravel. Emplaced non-woven geotextile fabric and covered with processed gravel.
12/3/2018	<ul style="list-style-type: none"> Sewer department onsite to locate and inspect onsite sewer manholes. Could not locate. Department provided AEI with GPS coordinates to get surveyed. Decontaminated frac tanks. CSE permit used to conduct work. Lined and loaded two railcars with TSCA and RCRA soils. Excavated non-TSCA soils and live-loaded for direct transport to RIRRC in Johnston, RI. Conducted SESC inspection. Imported processed gravel.
12/4/2018	<ul style="list-style-type: none"> Emplaced impermeable liner. Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. Revisited non-compliant excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis.
12/5/2018	<ul style="list-style-type: none"> Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. Recollected concrete samples in non-compliant locations and analyzed for PCBs. Warwick Tree removed large tree near northwest corner of property.
12/6/2018	<ul style="list-style-type: none"> Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. Imported Common Borrow and Processed Gravel. Diprete surveyed sewer manhole locations and as-built conditions. Backfilled compliant excavations using "wedge" cut soils.

DATE	WORK COMPLETED
12/7/2018	<ul style="list-style-type: none"> • Emplaced impermeable liner. • Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. • Imported Common Borrow and Processed Gravel.
12/10/2018	<ul style="list-style-type: none"> • Emplaced impermeable liner. • Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. • Imported Common Borrow and Processed Gravel. • Revisited non-compliant excavations and removed additional soils above the MPS. AEI recollected post excavation samples for PCB analysis. • Continued cutting "wedge". • Investigated sewer manhole locations. No sewer manholes identified. • Conducted SESC inspection.
12/11/2018	<ul style="list-style-type: none"> • Emplaced impermeable liner. • Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. • Imported Common Borrow and Processed Gravel. • Revisited non-compliant excavations in floodway and utilized remove material as onsite backfill. AEI recollected post excavation samples for PCB analysis.
12/12/2018	<ul style="list-style-type: none"> • Sealed seams of impermeable liner using asphaltic spray material. • Imported Common Borrow and Processed Gravel. • One monitoring well, MP-1D, inadvertently destroyed during regrading operations. To be properly closed by RI licensed well driller.



DATE	WORK COMPLETED
12/13/2018	<ul style="list-style-type: none"> • Seamed impermeable liner using asphaltic spray material. • Imported Common Borrow and Processed Gravel. • Excavated soils from area adjacent to TP-5. Required dewatering and treatment of groundwater removed from the excavation. Excavation was backfilled after collection of post excavation samples using Common Borrow.
12/14/2018	<ul style="list-style-type: none"> • Sealed seams of impermeable liner using asphaltic spray material. • Imported Common Borrow and Processed Gravel. • Continued cutting "wedge" along the floodway boundary.
12/17/2018	<ul style="list-style-type: none"> • Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. • Imported Common Borrow and Processed Gravel. • Set-up filtration/carbon system to treat groundwater. • Assisted sewer department with location sewer manholes.
12/18/2018	<ul style="list-style-type: none"> • Backfilled compliant excavations with Common Borrow. • Imported Common Borrow and Processed Gravel. • Started demobilization of perimeter air monitoring equipment. • Two railcars with TSCA soils transported offsite to CWM facility in Emelle, AL. Two railcars received.
12/19/2018	<ul style="list-style-type: none"> • Sealed seams of impermeable liner using asphaltic spray material. • Imported Common Borrow and Processed Gravel. • Decontaminated filtration/carbon system and collected wipe sample for PCB analysis. • Removed former decontamination pad and added to lined railcars. • Backfilled excavation using Common Borrow.

DATE	WORK COMPLETED
12/20/2018	<ul style="list-style-type: none"> Sealed seams of impermeable liner using asphaltic spray material. Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. Imported Processed Gravel. New England Geotech onsite to close damaged monitoring well (MP-1D). Diprete surveyed as-built conditions. Conducted SESC inspection.
12/21/2018	<ul style="list-style-type: none"> Lined and loaded railcars with TSCA soils. AEI monitored dust using one perimeter monitor. Finished remaining wedge cut and emplaced non-woven geotextile fabric. Imported Processed Gravel.
12/26/2018	<ul style="list-style-type: none"> Emplaced non-woven geotextile fabric (Mirafi 180N) and topped with imported processed gravel. Imported Common Borrow, Sand for electrical conduit and Processed Gravel. Prepared equipment and material laydown area for emplacement of electrical conduit along Mill Street property boundary commencing next day.
12/27/2018	<ul style="list-style-type: none"> Emplaced non-woven geotextile fabric (Mirafi 180N), but not topped with Processed Gravel to allow for installation of electrical conduit traversing site in the future. Completed trench to install electrical conduit along Mill Street. Hydroseeded site for temporary site stabilization. Imported Common Borrow.
12/28/2018	<ul style="list-style-type: none"> Transported roll-off container of non-TSCA soils to RIRRC in Johnston, RI. Demobilized decontaminated frac tanks. Emplaced Processed Gravel and compacted using vibratory roller. Imported Processed Gravel. Conducted SESC inspection.



DATE	WORK COMPLETED
12/31/2019	<ul style="list-style-type: none"> • Prepared carbon system for demobilization. • Finished covering site with non-woven geotextile fabric. • Emplaced Processed Gravel and compacted using vibratory roller.
1/2/2019	<ul style="list-style-type: none"> • Partial demobilization from site (trailer and storage box left on site). • Hydroseeded remaining portion of site.
1/3/2019	<ul style="list-style-type: none"> • Remobilized personnel to site to finish emplacing Processed Gravel over non-woven geotextile fabric left open for future installation of electrical conduit traversing site.
1/28/2019	<ul style="list-style-type: none"> • Conducted SESC inspection. SESC inspections were reduced to monthly during the lull in work between the remediation and final restoration measures scheduled for the spring/summer 2019.
2/25/2019	<ul style="list-style-type: none"> • Conducted SESC inspection.
4/30/2019	<ul style="list-style-type: none"> • Conducted SESC inspection.
5/13/2019	<ul style="list-style-type: none"> • Conducted SESC inspection.
5/30/2019	<ul style="list-style-type: none"> • Diprete installs final grade stakes to assist SES with final grading measures.
8/12 thru 8/16/2019	<ul style="list-style-type: none"> • Remobilize equipment to site for final restoration measures. • Install additional grade stakes using laser level and rod measurements. • Improvement of construction stone entrance. • Began importation and emplacement of final processed gravel lift. AEI performed spot elevation checks using laser level and rod. • Conducted a SESC Inspection.
8/19 thru 8/23/2019	<ul style="list-style-type: none"> • Continued emplacement of final processed gravel layer. • Conducted a SESC Inspection.
8/26/2019	<ul style="list-style-type: none"> • Continued emplacement of final processed gravel layer.
8/27/2019	<ul style="list-style-type: none"> • Continued emplacement of final processed gravel layer. • SES uncovered City-owned sewer force main vault to identify required fixes to concrete cover.
8/28/2019	<ul style="list-style-type: none"> • Continued emplacement of final processed gravel layer. Processed gravel was compacted using a vibratory roller.



DATE	WORK COMPLETED
8/29/2019	<ul style="list-style-type: none"> Continued emplacement of final processed gravel layer. Processed gravel was compacted using a vibratory roller. A health and safety audit was performed. No issues noted. AEI continued installing final grade stakes using laser level and rod. Conducted a SESC Inspection.
8/30/2019	<ul style="list-style-type: none"> Continued emplacement of final processed gravel layer. Processed gravel was compacted using a vibratory roller. Rip rap emplaced on the south side of the property to allow for a temporary access road to be installed for the groundwater investigation taking place in the southeast property corner. AEI continued installing final grade stakes using laser level and rod.
9/3/2019 thru 9/6/2019	<ul style="list-style-type: none"> Continued emplacement of final processed gravel layer. Processed gravel was compacted using a vibratory roller. AEI spot checked elevations using laser level and rod. Conducted a SESC Inspection.
9/9/2019	<ul style="list-style-type: none"> AEI marked out centerline of stone dust pathway. Thielsch Engineering onsite to measure compaction of final processed gravel layer. Results indicated a +95% relative compaction. New England Geotech onsite to verify oversized steel casings would fit over existing wells. SES begins emplacement of final 6-inch topsoil layer.
9/10/2019	<ul style="list-style-type: none"> SES emplaced bioretention soils within stormwater retention basins. SES continued emplacing topsoil.
9/11/2019	<ul style="list-style-type: none"> SES continued emplacing topsoil. New England Geotech onsite to decommission three (3) monitoring wells: P-3S, P-001S, and P-34S.
9/12/2019	<ul style="list-style-type: none"> SES continued emplacing topsoil. AEI marked out location where rip rap to be emplaced on southeastern side of site in lieu of topsoil, per BASF request. The stone is to be used as a temporary pad for the groundwater investigation.
9/13/2019	<ul style="list-style-type: none"> SES continued emplacing topsoil.

DATE	WORK COMPLETED
9/16/2019	<ul style="list-style-type: none"> • SES continued emplacing topsoil. • SES began installing stone dust pathway by emplacing landscape fabric and 3/8 inch crushed stone base.
9/17/2019	<ul style="list-style-type: none"> • SES continued emplacing topsoil. • SES continued installing stone dust pathway by emplacing landscape fabric and 3/8 inch crushed stone base. • New England Geotech onsite to begin well extensions.
9/18/2019	<ul style="list-style-type: none"> • SES continued emplacing topsoil. • SES continued installing stone dust pathway by emplacing landscape fabric and 3/8 inch crushed stone base. • Rebar installed to begin repair of concrete sewer vault.
9/19/2019	<ul style="list-style-type: none"> • SES continued emplacing topsoil. • SES continued installing stone dust pathway by emplacing landscape fabric and 3/8 inch crushed stone base. • Plywood shoring setup for concrete pour to repair the concrete sewer main vault cover.
9/20/2019	<ul style="list-style-type: none"> • SES continued emplacing topsoil. • SES continued installing stone dust pathway by emplacing stone dust on top of crushed stone base. • SES installs plywood and jacks to support the concrete pour for the repaired cover. A confined space permit and entry were performed by trained SES personnel.
9/23/2019	<ul style="list-style-type: none"> • SES continued emplacing topsoil. • SES continued installing stone dust pathway by emplacing stone dust on top of crushed stone base. • All Island landscaping onsite to begin installation of plantings and hydroseed.
9/24/2019	<ul style="list-style-type: none"> • SES finishing topsoil and stone dust walkway installation. • All Island continuing to install plantings. • SES begins demobilization of equipment. • Conducted a SESC Inspection.
9/25/2019	<ul style="list-style-type: none"> • SES finishing topsoil and stone dust walkway installation. • All Island continuing to install plantings. • Conducted a SESC Inspection.
9/26/2019	<ul style="list-style-type: none"> • All Island power raked northern portion of the property and began hydroseeding. Continued installing plantings.

DATE	WORK COMPLETED
9/27/2019	<ul style="list-style-type: none">• SES compacted stone dust walkway.
9/30/2019	<ul style="list-style-type: none">• All Island power raked site and hydroseeded.
10/1/2019	<ul style="list-style-type: none">• All Island finished hydroseed and installing mulch around plantings. Demobilized from site. All Island/SES will maintain the plantings and seeding per the contract.
10/2/2019	<ul style="list-style-type: none">• AEI demobilizing from the site.• Conducted a SESC inspection.

4.3 Worker and Public Safety

Daily safety briefings were conducted with site personnel and visitors to ensure an understanding of the site-specific health and safety plan prepared by SES. A pre-task plan was discussed during the daily briefing, which included proper personal protective equipment, standard operating procedures and emergency response actions for the respective tasks involved in that day's work. Each worker and visitor were required to certify their understanding of the health and safety procedures by signing the documentation, which is included with the daily project reports (**Appendix B**).

Considering the proximity of sensitive receptors, i.e., residential properties within 100 feet of the property boundary and the contaminants of concern, PCBs and VOCs, a site-specific air monitoring program was administered during the entire course of work involving the removal, management and final disposition of impacted soils. The air monitoring program included four perimeter monitors continuously recording dust levels; two set at the property boundary adjacent to the residential properties, one adjacent to Mill Street and one adjacent to the riverway where additional residential properties resided directly beyond. The actionable limit for total dust set at the property boundary, which was set below the total dust threshold of 0.150 mg/m^3 , was 0.100 mg/m^3 for a 15-minute block average. The real-time dust readings recorded at each monitor were transmitted wirelessly to a server which further processed the data into the specific 15-minute block average. If the action limit was exceeded, an alert was transmitted to field personnel. During the course of work and based upon the difference between upwind and downwind total dust concentrations, no exceedances of the total dust threshold were recorded.

The real-time dust data can be found in **Appendix D**. Due to a wireless communication issue, one monitor located adjacent to Mill Street did not record data from September 3, 2018 to October 17, 2018. The monitor was replaced and recording re-established.

The former toluene release site (SWMU-11) produced unpleasant odors and high total VOC readings during a preliminary excavation to collect a waste disposal characterization sample. To address off-site odors and VOC dispersion, a vapor suppression agent (Biosolve®) was broadcasted over the soil during excavation activities. AEI performed continuous worksite monitoring and periodic checks at the property boundary via PID, which demonstrated no offsite VOC migration occurred during the excavation of SWMU-11. Workers in the area of the excavation performed the work in Level C which included respirators with both particulate and VOC mitigating capabilities.

4.4 Additional Floodway Characterization and Soil Removal

As requested by EPA in their approval of the CMI Work Plan, additional soil samples were collected in the central section of the FEMA Floodway, **Figure 6**, to identify impacts above RIDEM residential and TSCA unrestricted use criteria ($< 1 \text{ mg/kg}$). This portion of the floodway area had not been previously sampled during the RFI or SRI. A total of seven soil borings to a depth of 4-feet bgs were proposed to collect soil samples for analysis of VOCs, PAHs, RCRA 8 metals, Pesticides, PCBs and total Cyanide. The results of the investigation showed the following:

- B-898 (0-4') exhibited a PCB concentration of 1.6 mg/kg. Analyzing the 0-2' and 2-4' composite samples for PCBs, indicated 0.4 and 0.6 mg/kg, respectively. Therefore, the boring was considered to contain PCBs < 1 mg/kg.
- PAH concentrations from borings B-896, B-897, B-898 and B-900 exceeded the RIDEM residential direct exposure criteria (R-DEC).
- No other sample results were above RIDEM R-DEC or TSCA unrestricted use criteria.

Table 3 provides a summary of the results. The laboratory reports are provided in **Appendix E**.

Since there are no GB Leachability criteria for PAHs in the RIDEM Remediation Regulations, BASF proposed to RIDEM to eliminate the possibility for direct exposure to these soils by removing the top 2-feet and backfilling the area to existing grade with clean imported fill. The removed PAH-impacted soils were approved by RIDEM on October 24, 2018 for re-use on site to backfill compliant excavations which were planned to be covered by the clean soil cover.

4.5 Monitoring Well Decommissioning

As part of the soil remediation activities (Section 5.5.3 of the CMI Work Plan), on-Site monitoring wells were either protected by SES or closed in accordance with the project technical specifications and RI Groundwater Quality Rules (250-RICR-150-05-3). Well closure involved removal of the riser and screen under the observation of a licensed well driller where required. The remaining holes were grouted by the licensed well driller with bentonite. A list of wells closed is included in the attached well closure letter, dated October 7, 2019, (**Attachment 6**) prepared by a RI-licensed well driller, New England Geotech of Jamestown, Rhode Island. The locations of the remaining monitoring wells are depicted on **Figure 2**.



4.6 Field Change Requests

The following table describes the field change requests (FCRs) issued during the soil remedy.

Item	Date Issued	FCR Description
1	9/10/2018	New Schedule of Values (SOV) Items 55 and 56 - Addition of daily crew rate for hammering concrete and re-dig samples.
2	9/28/2018	New SOV Item 58 – addition of stone for emplacement in excavations to minimize dewatering effort during backfill operations.
3	10/2/2018	New SOV Item 59 – Temporary stabilization of the site due to extended construction schedule and winter weather conditions.
4	10/2/2018	New SOV Item 60 – disposal rate for non-TSCA debris due to increased level of construction debris in soils designated for in-state landfill.
5	10/2/2018 and 10/8/2018	New SOV Items 61 and 62 – Treatment of PCB-impacted groundwater onsite and revised T&D groundwater rate due to increased quantity.
6	10/26/2018	New SOV Items 63 thru 66 – Mobilization and demobilization of three 30,000-gallon frac tanks and 6-inch pump to manage water generated during TP-5 excavation.
7	10/11/2018	New SOV Items 67 and 68 – Screener and crew rate to screen construction debris from soils designated for in-state landfill disposal.
8	11/2/2018	New SOV Item 69 – Odor suppressant (Biosolve) to manage odors during SWMU-11 excavation.

Item	Date Issued	FCR Description
9	11/2/2018	Increased volume of Type 1B soil excavation/stockpiling and Common Borrow Backfill by 164 cubic yards.
10	11/7/2018	New SOV Item 70 – Large tree removal using Warwick Tree company.
11	12/12/2018	New SOV Item 71 – Importation and emplacement of sand bedding for electrician.
12	12/6/2018	New SOV Item 72 – Carbon treatment system for use during excavation of SW area adjacent to TP-5.

4.7 As-Built Conditions

On a weekly basis during subsurface work, a RI-licensed surveyor (DiPrete Engineering) was mobilized to the Site to document the final excavation extents and depths, to identify backfilled areas, and to establish sub-grade elevations prior to final cover. The Post Remediation As-Built Conditions are shown on **Figure 7** which depicts the aforementioned Site features and topographical information.

As requested by USEPA in their approvals to requests for alterations of the CMI Work Plan (see **Section 2.2** and **Appendix A**) via two email correspondences dated October 23, 2018 and January 28, 2019, figures depicting the EPA/TSCA approved left in-place PCB-impacted soils are presented as **Figures 8** and **9**. These specific soils were left in-place due to technical impracticality and/or to maintain the structural stability of existing infrastructure, i.e., concrete deadman pinned to the riverway steel sheet piling. The laboratory analytical reports associated with the left-in place PCB-impacted soils are included in **Appendix F**.



4.8 Summary of Quantities

The following table summarizes the quantities of materials disposed offsite and imported for use on Site.

Item	Description	Quantity
1	Non-TSCA (< 50 mg/kg) / Non-RCRA soils – Disposed offsite to RIRRC	1,750.2 tons
2	Non-TSCA (< 50 mg/kg) / Non-RCRA debris – Disposed offsite to RIRRC	606 tons
3	TSCA (> 50 mg/kg PCBs) Soils – Disposed offsite to CWM Emelle	3,434.4 tons
4	RCRA / Non-TSCA soils – Disposed offsite to CWM Emelle	143 tons
5	TSCA Unrestricted Use Groundwater (< 0.5 ug/L) – Disposed offsite to Global	163,250 gallons
6	Imported Common Borrow	4,4913.4 tons
7	Imported Processed Gravel	11,202.4 tons
8	Imported Topsoil	3,130 tons

Disposal manifests and weight tickets are included in **Appendix G**.

5.0 POST-EXCAVATION CONDITIONS

5.1 Post-Excavation PCB Soil Sampling and Analytical Results

As described in **Section 2.3**, a TSCA post excavation program was implemented to determine whether the compliance metrics for PCBs had been achieved following removal of impacted soils. The sampling program included both laboratory and field analysis (Dexsil) to verify compliance with the PCB MPS. For PCBs, a total of 1,617 laboratory samples (1,799 with quality control) and 898 field screening samples (951 with quality control) were collected. The post excavation sample locations, including those sample locations that were subsequently excavated, are depicted on **Figures 10a** thru **10d**. **Table 2** summarizes the post excavation PCB analytical results, including sample locations that were later excavated. The laboratory reports are included in **Appendix G**.

5.2 Quality Assurance / Quality Control (QA/QC)

As outlined in the project-specific Sampling and Analysis Plan (SAP) (AEI, 2018) and the project specific Quality Assurance Project Plan (QAPP) (AEI, 2018 Appendix F), USEPA Tier I Plus data validation was performed on all data collected during the 2018 CMI program at the Site. Confirmatory soil and concrete samples for this program were collected between August 15, 2018 and December 17, 2018. A data validation report summarizing the results of the data evaluation has been produced for each laboratory data package. Each validation report is presented in **Appendix H**.

Per the QAPP guidelines, specific numbers of field duplicates and matrix spike/matrix spike duplicate (MS/MSD) quality control (QC) samples were submitted along with the soil and concrete PCB samples (equivalent to 5 percent [%] of primary samples). In addition, one solid trip blank sample was submitted with each VOC sample collection batch. Tables A and B below summarize the number of primary and QC samples collected for soil and concrete, respectively.

Table A - Primary and QC Soil Samples Submitted/Analyzed

Parameter	No. of Samples	5% of Samples ⁽¹⁾	No. of Field Duplicates	No. of MS/MSDs	No. of Trip Blanks
PCBs (EPA 8082A)	1553	78	96 ⁽²⁾	79	0
VOCs (EPA 8260B)	17	1	1	1	3 ⁽³⁾

No. = Number

⁽¹⁾ 5% of samples (1 in 20) is the required/planned minimum number of Field Duplicates and MS/MSDs in the PCB sampling program.

⁽²⁾ Two Field duplicates collected were analyzed past hold time and determined to be invalid for evaluation of QC. Therefore, 96 is the final number of valid duplicates collected.

⁽³⁾ VOC samples were submitted in 3 sample collection batches, with 1 solid trip blank accompanying each batch.



Table B - Primary and QC Concrete Samples Submitted/Analyzed

Parameter	No. of Samples	5% of Samples	No. of Field Duplicates	No. of MS/MSDs
PCBs (EPA 8082A)	64	3	4	4

No. = Number

The requisite number of solid trip blank samples were collected in association with the VOC samples. The requisite minimum number of 5% for collection of PCB QC samples was met for field duplicates, MS, and MSD samples, for each matrix (soil and concrete). No equipment blank samples were collected, as none were required based on the sampling methodology (dedicated sampling equipment).

In addition to those samples identified above, soil samples were also submitted for analysis of semi-volatile organic compounds (SVOCs) (10 samples), and pesticides, metals, and cyanide (4 samples each) from a small portion of the floodway (see Section 4.4). While data validation was performed for all samples and analyses, as supplementary information, no QC samples were collected for SVOCs, pesticides, metals, or cyanide under the sampling program. Other than the trip blanks, the project QAPP did not require field collection of QC samples for the non-PCB analytical methods, as these analytical methods and sample numbers were not a significant part of the CMI program.

AEI's data validator made the determination that the QC samples collected were satisfactory for evaluation of the CMI sampling program (refer to **Appendix H**).

5.2.1 Data Validation Methodology

Per the project SAP, data validation of the laboratory analytical results included a USEPA Region 1 Tier I Plus review process, involving both the laboratory Quality Assurance Office (QAO) and the Construction Management (CM) QAO. The Tier I Plus review had two parts:

- Part I: Tier 1 Data Review provides basic information about the completeness of the data package and qualifies sample results based on reported laboratory QC results, including laboratory contamination. For Contract Laboratory Program (CLP) data, Tier 1 is performed electronically by the laboratory, although the CM QAO performed a manual review. Review procedures followed those stipulated in the EPA NE Environmental Data Review Supplement, Chapter 2 (USEPA, 2013).
- Part II: Tier 1 Plus includes the qualification of sample results based on field duplicate sample precision data; and equipment, trip or bottle blank contamination, % solids, and organic MS/MSD or pesticide and Aroclor Sulfur clean-up. Specific review procedures and qualification followed USEPA Contract Laboratory Program National Functional Guidelines (NFG) for Superfund Organic Methods Data Review, August 2014, OSWER 9240.1-48, USEPA-540-R-08-01 (12).



When the NFG qualification procedures specify professional judgment, the reviewer manually evaluated the data to determine whether to accept, estimate (J, UJ), or reject (R) sample results. This data validation methodology was followed, as described above, for review of all CMI soil and concrete data, with one adjustment. The SAP indicated that the NFG for Superfund Organic Methods Data Review was the June 2008 publication. However, the NGF was updated in August 2014, and it was this update that was used as a reference during the QAO's validation process. No primary sample data (i.e., non-QC sample) collected during this sampling program were rejected (i.e., none were declared invalid or unusable), although two soil field duplicates and several MS/MSDs for PCBs were determined to be invalid, as discussed below. Some data results within the CMI program were qualified as estimated (with a J qualifier for detected results, UJ for non-detected results) based on hold times, surrogate recoveries, field duplicate Relative Percent Difference (RPD) values, laboratory control sample (LCS)/LCS duplicate (LCSD) recoveries or RPDs, MS/MSD recoveries or RPDs, dual column RPDs, or continuing calibration results. All data qualifiers applied as a result of the validation project, as identified in Table 1 of each data validation report with their supporting reason codes, are included in the attached data summary tables. Data validation reports are provided within **Appendix H**.

5.2.2 Data Usability Opinion

Based upon the QA/QC review of the sampling program, as detailed above, the following is a Data Usability Summary and Opinion for the 2018 CMI program.

Representativeness – Soil and concrete samples were collected from all locations identified in the approved project QAPP, except for the following deviations:

- the planned 6-foot excavation in the northeast FEMA floodway encountered concrete structures (e.g., vaults) and the depth of final excavation (15 feet bgs) combined with limited excavator access in this area prohibited AEI from collecting sidewall samples;
- Bottom samples B-903 thru B-906 and sidewall samples SW-693 thru SW-700 were added following the approved QAPP/SAP due to the results for a PCB pre-characterization sample > 25 mg/kg;
- Addition of bottom samples B-907 thru B-922 and sidewall samples SW-702 thru 713 due to encountering PCBs > 25 mg/kg during pre-characterization sampling.
- Addition of delineation samples used to define separation between TSCA (>50 mg/kg) and non-TSCA soils.

Additional confirmatory samples were collected from all locations where expansion of the excavation boundaries were necessary to remove non-compliant soils, based on the sampling program data.

All samples were submitted for laboratory analysis of either PCBs by Method 8082A, VOCs by Method 8260B, SVOCs by Method 8270D, pesticides by Method 8081B, ICP metals by Method 6010C, mercury by Method 7471B, or cyanide by Method 9014, for the target analyte lists identified within the QAPP. All are USEPA SW-846 current methods. Soil and concrete samples were collected in laboratory-supplied glassware, of sufficient sample volume, stored in a



refrigerated cooler, transferred to the laboratory under chain-of-custody protocols, and analyzed within the appropriate holding times, unless otherwise noted. Appropriate sample procedures and sample containers were utilized. Sample dilutions appeared to be appropriate for the concentrations of contaminants identified.

As noted in Tables A and B above, the requisite number of MS/MSD samples were requested to provide additional QC information for the sample program. However, a limitation of the MS analysis is that recovery results become invalid (unusable) if the native (pre-spiked) sample concentration is too high, in comparison to the spiked concentration (i.e., the spiked concentration is overwhelmed by the native result). Thus, a number of the MS/MSD analyses performed on samples in this sampling program were unusable. A sufficient number of valid MS/MSD analyses were reviewed to indicate acceptable precision and accuracy within the program (in combination with other QC information).

Data, as qualified, appear to be consistent with the Conceptual Site Model; data are consistent with previous sampling events with no unusual or unanticipated detected compounds, and show an acceptable level of representativeness which meet project-specific Data Quality Objectives (DQOs).

Comparability – The sample collection techniques represent USEPA Standard Procedures, as outlined in the Project QAPP. Sample collection techniques were accurately documented by AEI, indicating a sufficient degree of comparability, reproducibility and representativeness. The analytical methods used are comparable to previous sampling events. Overall, PCB data, as well as the limited data for the other analytical methods, appear consistent temporally with historical sampling events and aurally with similar data points. Overall, the sample program shows an acceptable level of comparability which meets project-specific DQOs.

Precision – Precision, or a measurement of the reproducibility of the data, was evaluated based on RPD calculations between LCS and LCSD samples analyzed with each analytical batch, between MS and MSD samples, between the two analytical columns run for every PCB sample (per analytical methodology), and between primary and duplicate samples collected in the field. Overall, the sample program shows an acceptable level of precision which meets project-specific DQOs.

Accuracy – Accuracy was evaluated based on appropriate sampling procedures, holding times, sample surrogate recoveries, analytical calibrations, internal standards, LCS and LCSD recoveries, and MS and MSD recoveries.

The PCB analytical method performed on the project samples (Method 8082A) does not indicate a specific hold time for solids' samples collection to extraction time. However, the project-specific QAPP listed this hold time as the same as the recommended USEPA guidance of 7 days. Within the CMI program, several samples were extracted beyond this 7-day hold time (as identified below). These data were qualified as estimates (assigned J or UJ qualifiers), per data validation protocol. However, given the stable nature of PCBs, particularly in solids samples, it is unlikely that the exceedances identified would have had a significant impact on data quality.

Sample	Collection Date	Days Beyond Extraction Hold Time
W-14 0-1	8/17/2018	3
W-14 1-2	8/17/2018	3
W-17 1-2	8/17/2018	3
W-17 0-1	8/17/2018	3
W-33B 0-1	8/17/2018	3
SW-693-092518-A 0-3FT	9/25/2018	4
B-422-092518 1FT	9/25/2018	15
B-37-112118 1FT	11/21/2018	1

Samples received on September 19, 2018, November 26, 2018, and December 5, 2018 all had recorded cooler temperatures (13.0, 6.3, and 13.9°C, respectively) above the recommended preservation temperature of 6°C. Samples received on September 19 and December 5 were delivered to the laboratory on ice on the same day as collection. Although samples delivered on November 26 arrived six days after collection, the samples were confirmed to arrive on ice (thus meeting regulatory criteria) and were extracted within less than a day of arrival. Given the limited time from collection and the known contaminant persistence (materials containing PCBs were historically used industrially due to their persistence at high temperatures), no impact on the data quality is expected, and thus the data were not qualified based on these temperature exceedances (ranging from 6.3 to 13.9°C).

In order to assess the effectiveness of the analytical method for each sample matrix, a known concentration of one or more surrogate compounds (organic compound similar in chemical behavior to the target analytes not normally found in environmental samples) is added to the sample being analyzed. Percent recoveries are calculated for each surrogate compound and compared to the recommended acceptable ranges. Similar to the issue for analysis of MS recoveries within a higher concentration sample, PCB surrogate concentrations were often diluted to levels below instrument detection limits, within samples which required higher dilutions in order for one or more analyte concentrations in the sample to be within instrument calibration range. Generally, any PCB analyzed sample which was diluted greater than 10 times did not have detectable surrogate concentrations. However, as this lack of information does not indicate a data quality issue, qualification to the data was not made if a surrogate concentration could not be detected for this reason. When surrogate recoveries could be calculated, a number of samples had recoveries outside the QC limits, requiring data qualification. However, a high percentage of these recoveries were above QC limits, indicating potential positive bias to the detected concentrations. Thus, many of the qualified, detected PCB results would be considered conservative based on this indicated bias.

Overall, the sample program shows an acceptable level of accuracy which meets project-specific DQOs.

Completeness – The laboratory analyzed for all targets listed in the project QAPP. Based on historical data, the TAL appears appropriate for contaminants historically identified at the Site. The number of data points appears adequate to monitor the magnitude and aerial extent of release. All data collected are deemed usable. All samples submitted to the laboratory were analyzed and reported. Therefore, the sample program shows an acceptable level of completeness which meets project-specific DQOs.

As indicated above, all necessary trip blank, field duplicate, and MS/MSD samples were submitted to the laboratory and analyzed. AEI's data validator and Project Manager have determined that the QC samples collected were satisfactory for evaluation of the sampling program.

Therefore, the QC program was complete and sufficient for evaluation of overall data quality.

Sensitivity – Sensitivity of the laboratory's analytical methods and equipment was evaluated based upon appropriate sample volumes, method blank, field equipment blank, and trip blank results, sulfur removal practice, and the laboratory reported RDLs.

An appropriate sample volume was collected for all primary and QC samples and, therefore, insufficient sample volume did not have an impact on analytical reporting limits. The method for analysis of all samples is current and consistent with industry standard.

No contaminants were detected above the laboratory method detection limits in any of the method blank or trip blank samples. As noted above, collection and analysis of equipment blanks was not required within the sampling program.

Per PCB sample preparation methodology, sulfur removal (by copper cleanup method) was performed by the laboratory, where necessary. The laboratory recorded sulfur removal performed on a total of 42 samples, analyzed in 10 batches scattered throughout the sampling program. These data were reported within the following laboratory data packages: 1809178 (samples 06, 09, 10, 13, 16, and 19); 1809179 (samples 01 and 17); 1810304 (samples 01, 05, 06, 13, 15, 17, 18, and 19); 1810409 (samples 04-08, 10-14, and 19); 1810454 (samples 01, 02, and 05); 1810580 (sample 15); 1810628 (sample 08); 1810825 (sample 10); 1810863 (sample 12); and 1812355 (samples 01-08). For specifics on these samples, see the data validation reports for these packages in **Appendix H**. For each sulfur cleanup sample analytical batch, a separate batch method blank and LCS/LCSD samples were analyzed (per protocol). No concentrations were reported in the method blank samples.

RDLs for all undiluted samples matched the QAPP Project Quantitation Limits (PQL) with the exception of some of the samples with lower % solids, for which the Minimum Reporting Limit (MRL) was adjusted up slightly. As the PQL (0.05 mg/kg) was significantly lower than the Project Action Limit (PAL) for PCBs (25 mg/kg), this adjustment had no impact on data sensitivity. When one or more PCB concentrations were identified or believed to be above the instrument calibration range, the laboratory either analyzed the sample twice (usually undiluted and at an appropriate dilution factor), or analyzed the sample once at dilution, in order for all concentrations to be within instrument calibration range. This was done per standard method protocol. For all locations with samples analyzed at dilution, the dilution factors were deemed to be necessary in order to quantify the concentrations detected.

In cases when the samples were analyzed undiluted and at dilution, the only MRLs raised were for the detected Aroclors reported from the diluted run. Therefore, there was no impact on data sensitivity for these samples. Where the samples were analyzed once, at a dilution, all MRLs were raised by the dilution factor, including for Aroclors reported as non-detect. A large majority of samples analyzed in this way had MRLs below the PAL (25 mg/kg), and therefore these results did not cause a data sensitivity issue to the program. The following samples required a level of dilution that resulted in MRLs above the PCB PAL:

Sample ID	Sample Date	MRL (mg/kg)
B-812-090718 6ft	9/7/2018	30.8
B-811-090718 5ft	9/7/2018	304
B-811-090718-1 5ft	9/7/2018	318
B-820-090718 5ft	9/7/2018	33.1
B-798-090718 6ft	9/7/2018	29.2
B-815-090718 5ft	9/7/2018	35.7
B-809-090718 5ft	9/7/2018	317
B-803-090718 5ft	9/7/2018	34.3
B-815-A-101218 7FT	10/12/2018	132
B-812-102918-B 13FT	10/29/2018	38.2
B-829-112818-A 6FT	11/28/2018	45.3
B-835-112818-A 6FT	11/28/2018	459

Given that the elevated concentrations in these samples required additional excavation, and as a result new confirmatory samples were collected, this does not indicate an impact on final confirmatory sample data sensitivity.

Based upon RDLs obtained, laboratory reporting methodology, sulfur cleanup protocol, and blank results as discussed above, the sampling program, as qualified, shows an acceptable level of sensitivity which meets project-specific DQOs.

5.2.3 Data Usability Assessment Conclusions and Recommendations

Based on the findings of this Data Usability Assessment, no primary sample data were rejected (i.e., determined to be unusable) based on USEPA National or Region I validation protocol. All primary data collected are considered usable, with qualification as detailed above, within the reports presented in **Appendix H**, and within the attached data table (**Table 2**). The program exceeds the 90% minimum completeness objective, and the usable results are considered acceptable for evaluation of soil in this CMI program.



5.3 PCB Soil Statistical Evaluation

AEI prepared summary tables of the SRI PCB data (historical data) and the post-excavation PCB data. **Table 1** presents all of the pre-CMI PCB data, including sample locations that have now been excavated. **Table 2** presents a summary of all the post excavation soil PCB analytical results (Dexsil and Laboratory methods) including samples that were ultimately excavated and are no longer representative of current conditions. Two additional tables were created which exclude all samples that were excavated during the remedial activities in order to determine compliance with the 95% UCL of less than 10 mg/kg PCBs criteria. The gleaned historical data (Historical PCB Data Representative of Current Conditions) is presented in **Table 4** and the 2018 post-excavation PCB data (Laboratory and Dexsil results) with excavated samples removed and sorted by PCB concentrations is presented in **Table 5**. The data in these tables were used to calculate the 95% UCL for both sets of data.

The purpose of the statistical analyses presented below is to determine the mean PCB concentration in soils on the Site after the completion of the remedial actions presented above. The two sets of data were evaluated separately to provide the most conservative estimate for the 95% UCL for the excavated areas. The summary statistics for the two sets of data available (historical data for areas not excavated and current post-excavation data) are as follows:

Summary Statistics for Historical Soil Data (From Unexcavated Areas only)	
Total # of Samples:	284
# Samples <10 ppm:	251
% Samples <10 ppm:	88%
# Samples <1 ppm:	155
% Samples <1 ppm:	55%
Geomean:	0.64
Average Concentration:	3.33
Standard Deviation:	5.38

Summary Statistics for Post-Excavation Soil Data	
Total # of Samples:	1579
# Samples <10 ppm:	1246
% Samples <10 ppm:	79%
# Samples <1 ppm:	597
% Samples <1 ppm:	38%
Geomean:	1.5
Average Concentration:	5.1
Standard Deviation:	6.4

It is notable that both sets of data show that 79% or greater of the PCB sample results are < 10 mg/kg.

AEI also prepared histograms of both sets of data. A histogram is a diagram consisting of rectangles whose area is proportional to the frequency of a variable (in this case, the number of samples in a class interval) and whose width is equal to the class interval (in this case, PCB concentration range). The histograms for the data sets show that the majority of the PCB data are < 10 mg/kg.

Q-Q Plots (Quantile-Quantile plots) were also prepared for the historical and post excavation PCB data sets. A Q-Q plot is a plot of two quantiles against each other. A quantile is a fraction where certain values fall below that quantile. For example, the median is a quantile where 50% of the data fall below that point and 50% lie above it. The purpose of Q-Q plot is to find out if two sets of data come from the same distribution. A 45 degree angle is plotted on the Q-Q plot; if the two data sets come from a common distribution, the points will fall on that reference line. The Q-Q plots show that the data are not normally distributed because it does not fall on a straight line. Therefore, when AEI evaluated the two data sets using the USEPA ProUCL software, the data was not evaluated using a normal distribution.

AEI used the Pro UCL software (version 5.1) to calculate the 95% UCL for the PCB data sets (historical and 2018 post excavation) which are representative of current, post-remediation site conditions. The main objective of the ProUCL software (funded by the U.S.EPA) is to compute rigorous decision statistics to help decision makers in making reliable decisions which are cost-effective, and protective of human health and the environment. The two data sets were evaluated separately since they were collected years apart and from different areas of the site (excavated versus unexcavated areas). In addition, evaluating the 2018 post-excavation data without the data from unexcavated areas is more conservative due to higher detections in the 2018 post excavation data set compared to the historical data set. The calculated 95% UCLs for the historical data and the post-excavation data sets are: **4.725 mg/kg** and **5.813 mg/kg**, respectively. Both of these are 95% KM (Chebyshev) UCLs (UCL based on Kaplan-Meier estimates using the Chebyshev inequality). Details of the historical and post excavation Pro UCL outputs, histograms and Q-Q Plots are presented in **Appendix I** and **J**, respectively.

The results of the Pro UCL evaluation demonstrates the post remediation conditions are in compliance with the 95% UCL of 10 mg/kg (primary MPS).

5.4 Post-Remediation Site Conditions

The post-excavation concentrations of PCBs in the soils remaining on Site are shown on **Figure 11**. Once post-excavation PCB data demonstrated compliance with the MPS, the excavation areas were backfilled using imported clean fill (Common Borrow) to existing grade. Outside the FEMA Floodway and sewer easement, an impermeable cover consisting of either a low linear density polyethylene (LLDPE) or high-density polyethylene (HDPE) was emplaced in areas where discrete sample locations contained > 10 mg/kg PCBs and where these soils were not sequestered beneath existing concrete (**Figure 12**). The impermeable cover encompassed approximately 37,319 square feet (0.86 acres). The seams between separate impermeable panels were sealed using an asphaltic material (GeoSeal), which chemically binds the two materials to create a tight seal.

Above the impermeable cover, a non-woven geotextile fabric (Mirafi 180N) was emplaced as a visual demarcation layer. The entire 3.25-acre property was covered by the fabric, except for the 25-foot wide City of Cranston sewer easement located on the northern property boundary and within the FEMA Floodway. An 18-inch imported processed gravel layer was then emplaced over the fabric and sewer easement in all areas except for the stormwater basins and compacted via vibratory roller to 95% relative compaction.

Monitoring wells remaining on-Site following the soil remediation program were extended to stickup at least 2-feet above the final grade and surrounded by a locking protective metal well casing.

Final site restoration included a 6-inch imported topsoil cover, except in the final landscaping stormwater basins, where a bioretention soil mixture was installed. The stormwater basins were prepared using a 6-inch layer of crushed stone and 6-inch layer of bioretention soils. A temporary stone access road, to facilitate vehicle and equipment access for the groundwater remedy in the southeast corner of the property, was installed on the southern portion of the property. Plantings, consistent with an upland wetland habitat were installed around the site and surrounded by a 3-inch layer of mulch. Hydroseeding, using three different seed mixtures, was performed by SES's subcontractor, All Island Landscaping of Portsmouth, Rhode Island. The final restoration is illustrated on **Figure 13**. The seed and plantings will be maintained by SES and All Island until establishment according to the technical specifications is achieved.

6.0 CONCLUSION – SITE CLOSURE DOCUMENTATION AND STATUS

The calculated 95% UCLs for both the excavated and un-excavated data sets (representative of current, post-excavation conditions) are significantly less than the MPS of 10 mg/kg PCBs. Based on this evaluation, it is concluded that the soil remedial action objective for the Lot 1102 (200 Mill Street) Site has been met and no further actions are necessary. Over 5,790 tons of PCB-impacted soils were removed from the Site and disposed off-Site at an appropriate disposal facility. The approximate remediation cost for this project is \$3,600,000. The Site has been stabilized with new vegetation and an ELUR, with Soil Management Plan and a Clean Soil Cover Monitoring and Maintenance Plan exhibits (**Attachments 3, 4 and 5**) has been recorded with the property deed to restrict Site activities and use in perpetuity, as required by the approved CMI Work Plan. Therefore, BASF concludes that the remedy for this Site has provided adequate protection of human health and the environment and has achieved a "Corrective Action Completion with Controls" status, in accordance with the RCRA Corrective Action program.

7.0 REFERENCES

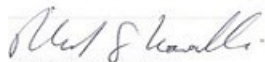
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- TSCA, 2016, "Part 761 – Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions; Subpart D – Storage and Disposal; Section 761.61 – PCB Remediation Waste", July 1, 2016.



8.0 CERTIFICATION STATEMENTS

Statement of Certification by the CMI Closure Report Preparer:

I prepared this CMI Closure Report and certify the information contained in the CMI closure document is accurate to the best of my knowledge.



Richard G. Kowalski, CPG, CHMM
AEI Consultants
112 Water Street, Fifth Floor
Boston, MA 02109

Statement of Certification by the Performing Party Authorized Representative:

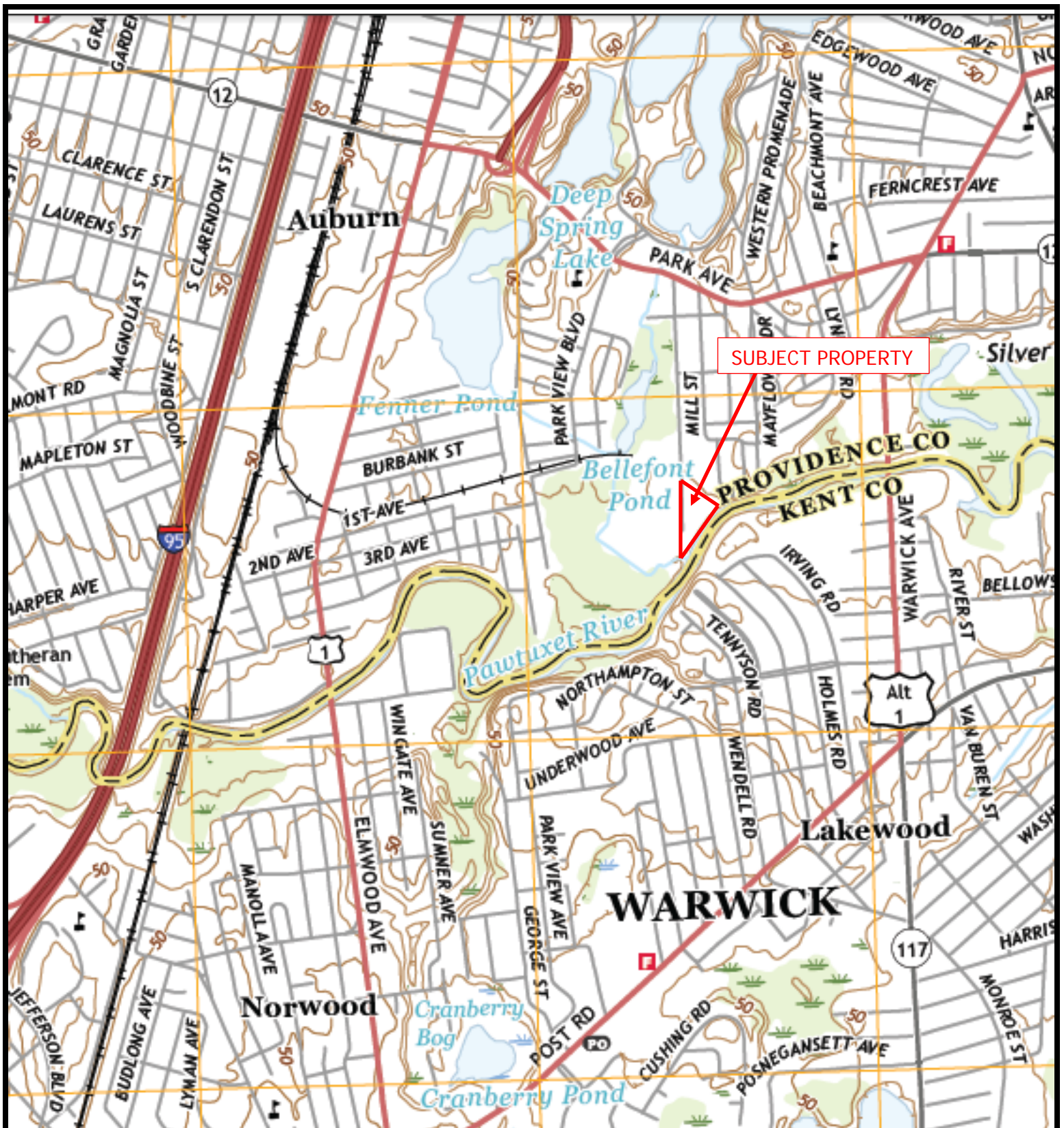
I certify that this CMI Closure Report is a complete and accurate representation of the contaminated-site and contains all known facts surrounding the activities associated with remediation of former releases to the best of my knowledge.



Joseph Guarnaccia, Ph. D., EHS Remediation Specialist
BASF Corporation
100 Park Avenue
Florham Park, New Jersey 07932



FIGURES



Legend

Approximate Property Boundary ———

Source: USGS Topographic Map *Providence, Rhode Island* (2018)

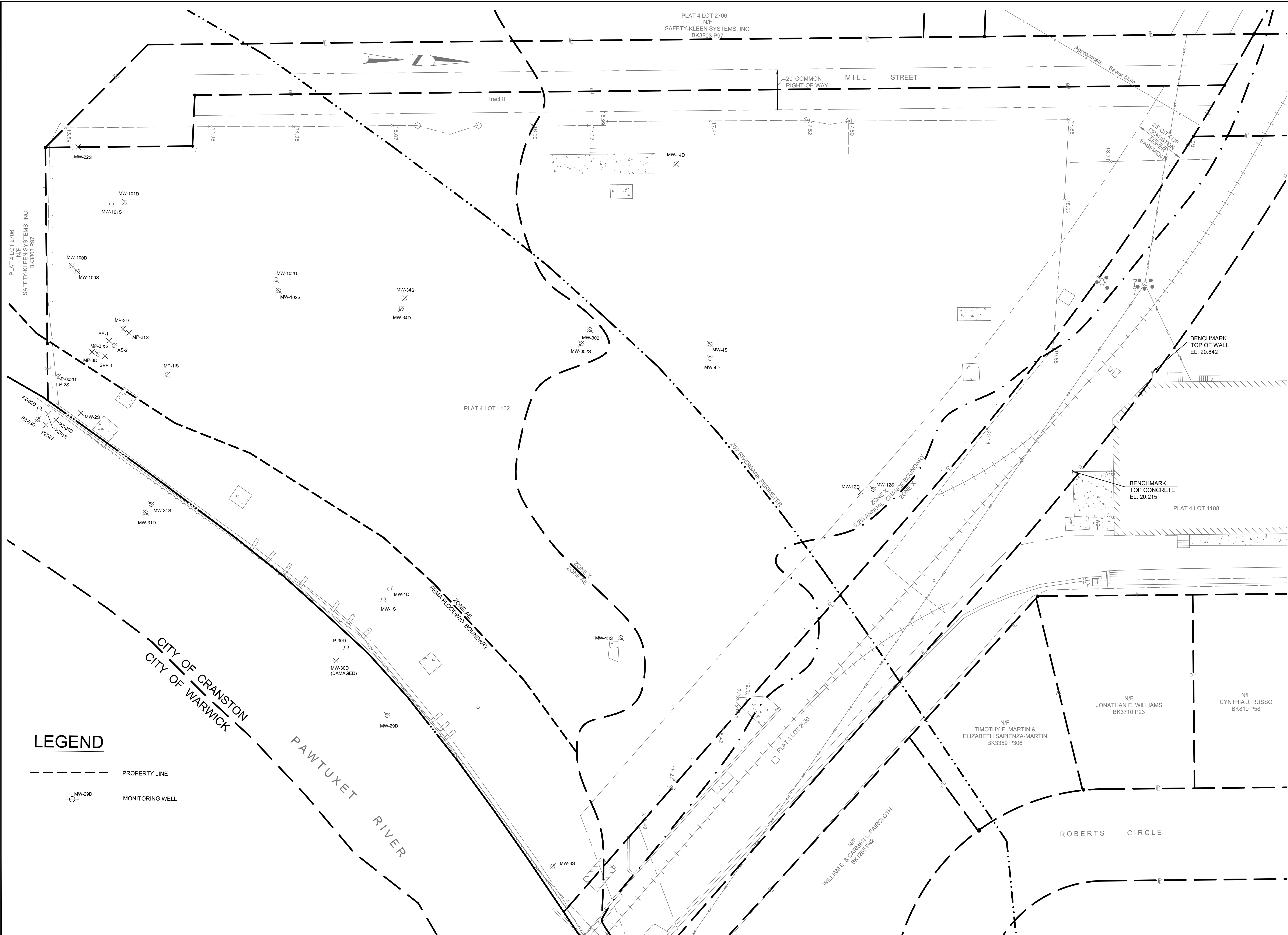


Figure 1: SITE LOCATION MAP

200 Mill Street, Cranston, RI 02905

Project Number: 363655

AEI
Consultants




PROJECT

**BASF FORMER CIBA-GEIGY
FACILITY**

**200 MILL STREET
CRANSTON, RHODE ISLAND**

AEI Consultants



DRAWING TITLE		REVISIONS		BY	
RCRA SITE OVERVIEW		NO.	DATE		
		1	11/28/17	SHEET REVISED PER COMMENTS	

AEI PROJECT NO.: 363655

DATE: JANUARY 30, 2019

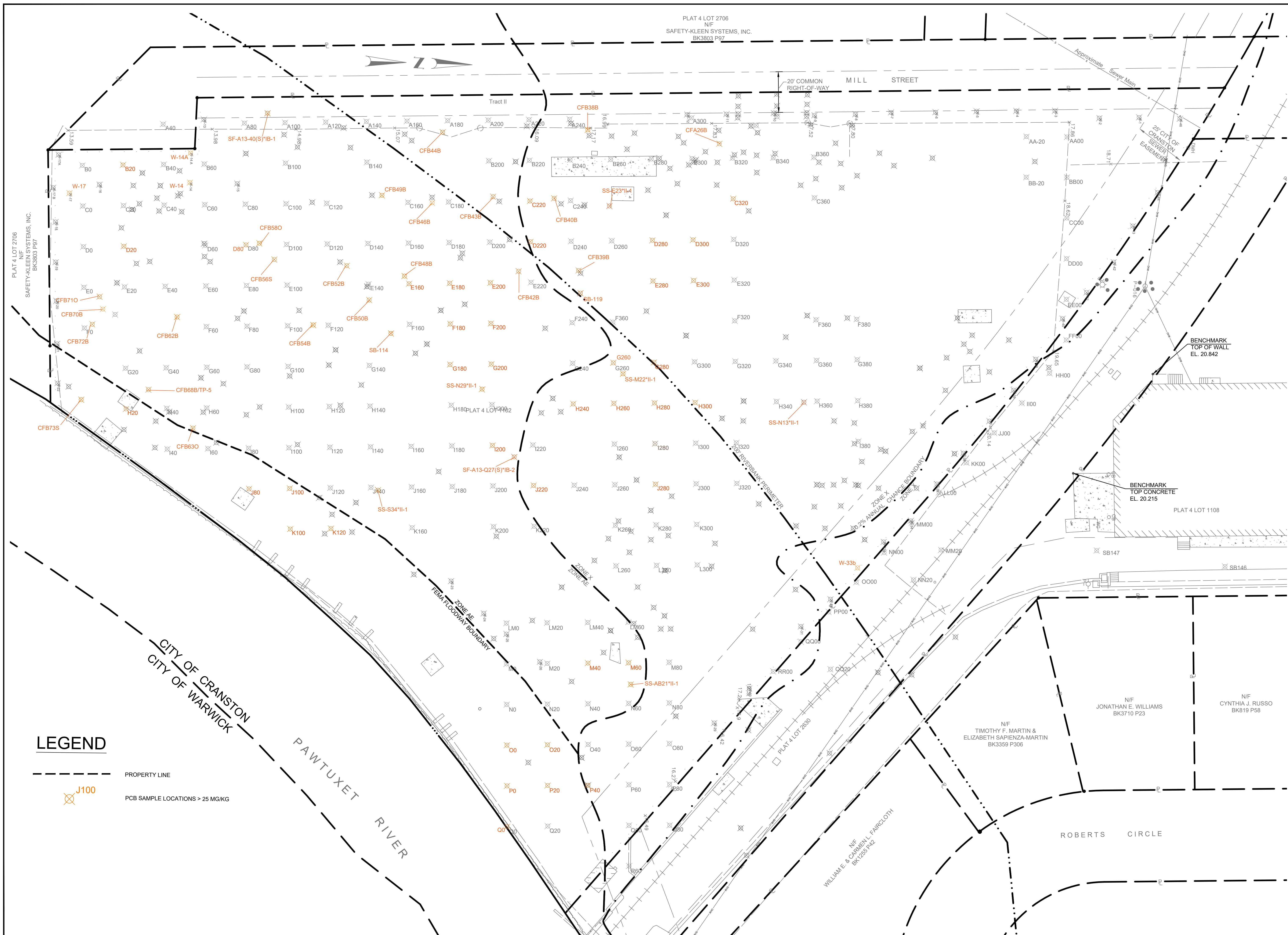
SCALE: 1" = 20'

DRAWN BY: A. TING

CHECKED BY: R. KOWALSKI

DRAWING NUMBER

2



PROJECT

**BASF FORMER CIBA-GEIGY
FACILITY
200 MILL STREET
CRANSTON, RHODE ISLAND**


AEI Consultants

DRAWING TITLE		
PCB SAMPLE LOCATIONS AND PCBs > 25 MG/KG		
NO.	DATE	REVISIONS
1	11/28/17	SHEET REVISED PER COMMENTS

AEI PROJECT NO.: 363655

DATE: JANUARY 30, 2019

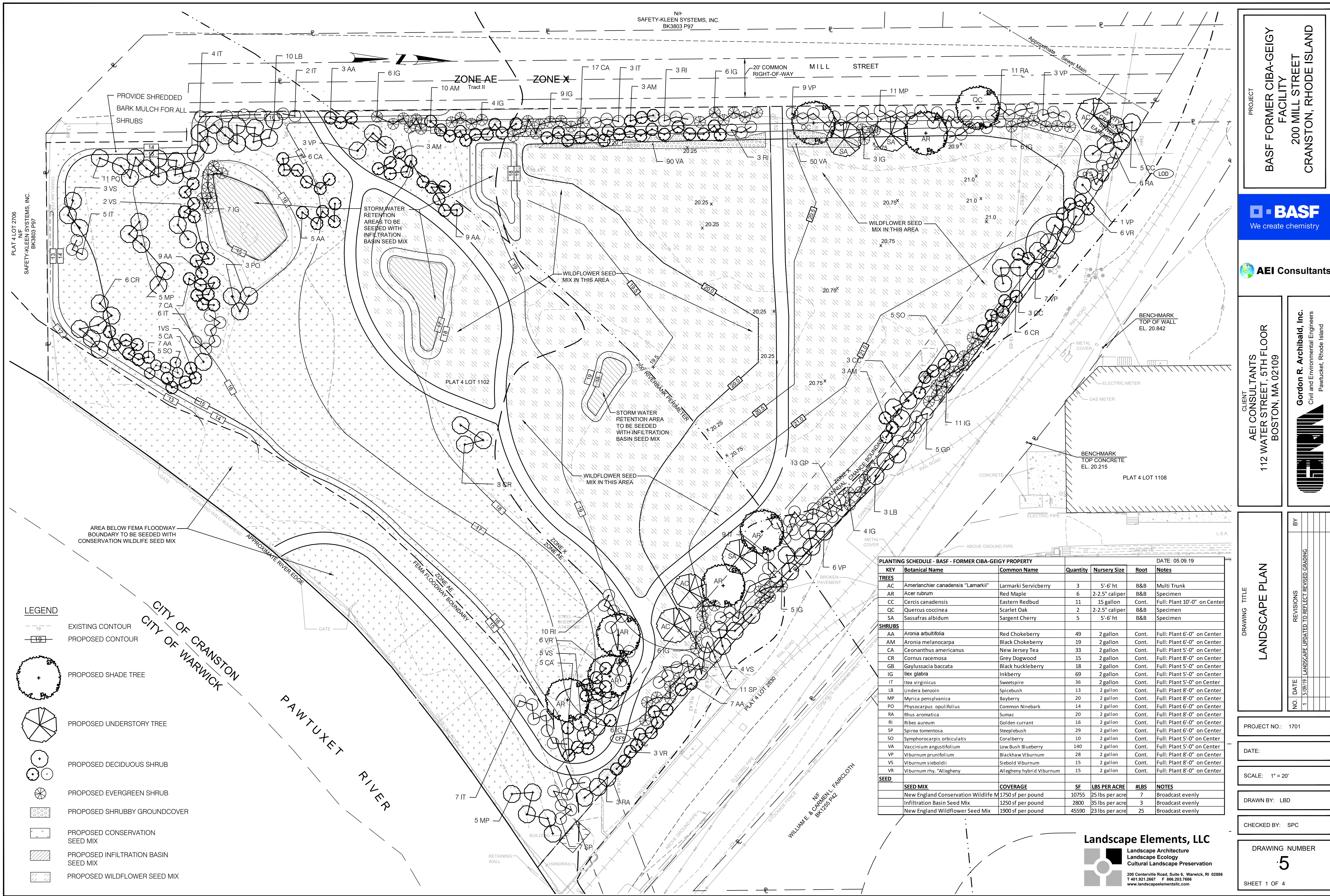
SCALE: 1" = 20'

DRAWN BY: A. TING

CHECKED BY: R. KOWALSK

DRAWING NUMBER

3



NIT-
SAFETY-KLEEN SYSTEMS, INC.
BK3803 P97

PLAT 4 LOT 2706
N/F
SAFETY-KLEEN SYSTEMS, INC.
BK3803 P97

- LEGEND**
- EXISTING CONTOUR
 - PROPOSED CONTOUR
 - PROPOSED SHADE TREE
 - PROPOSED UNDERSTORY TREE
 - PROPOSED DECIDUOUS SHRUB
 - PROPOSED EVERGREEN SHRUB
 - PROPOSED SHRUBBY GROUND COVER
 - PROPOSED CONSERVATION SEED MIX
 - PROPOSED INFILTRATION BASIN SEED MIX
 - PROPOSED WILDFLOWER SEED MIX

PLANTING SCHEDULE - BASF - FORMER CIBA-GEIGY PROPERTY							DATE: 05.09.19
KEY	Botanical Name	Common Name	Quantity	Nursery Size	Root	Notes	
TREES							
AC	Amerlanchier canadensis "Lamarkii"	Larmarkii Serviceberry	3	5'-6" ht	B&B	Multi Trunk	
AR	Acer rubrum	Red Maple	6	2-2.5" caliper	B&B	Specimen	
CC	Cercis canadensis	Eastern Redbud	11	15 gallon	Cont.	Full: Plant 10'-0" on Center	
QC	Quercus coccinea	Scarlet Oak	2	2-2.5" caliper	B&B	Specimen	
SA	Sassafras albidum	Sargent Cherry	5	5'-6" ht	B&B	Specimen	
SHRUBS							
AA	Aronia arbutifolia	Red Chokeberry	49	2 gallon	Cont.	Full: Plant 6'-0" on Center	
AM	Aronia melanocarpa	Black Chokeberry	19	2 gallon	Cont.	Full: Plant 6'-0" on Center	
CA	Ceanothus americanus	New Jersey Tea	33	2 gallon	Cont.	Full: Plant 5'-0" on Center	
CR	Cornus racemosa	Grey Dogwood	15	2 gallon	Cont.	Full: Plant 8'-0" on Center	
GB	Gaylussacia baccata	Black huckleberry	18	2 gallon	Cont.	Full: Plant 5'-0" on Center	
IG	Ilex glabra	Inkberry	69	2 gallon	Cont.	Full: Plant 5'-0" on Center	
IT	Itea virginicus	Sweetspire	36	2 gallon	Cont.	Full: Plant 5'-0" on Center	
LB	Lindera benzoin	Spicebush	13	2 gallon	Cont.	Full: Plant 8'-0" on Center	
MP	Myrica pensylvanica	Bayberry	20	2 gallon	Cont.	Full: Plant 8'-0" on Center	
PO	Physocarpus opulifolius	Common Ninebark	14	2 gallon	Cont.	Full: Plant 6'-0" on Center	
RA	Rhus aromatica	Sumac	20	2 gallon	Cont.	Full: Plant 8'-0" on Center	
RI	Ribes aureum	Golden currant	16	2 gallon	Cont.	Full: Plant 6'-0" on Center	
SP	Spiraea tomentosa	Steepiebush	29	2 gallon	Cont.	Full: Plant 6'-0" on Center	
SO	Symphoricarpos orbiculatis	Coralberry	10	2 gallon	Cont.	Full: Plant 5'-0" on Center	
VA	Vaccinium angustifolium	Low Bush Blueberry	140	2 gallon	Cont.	Full: Plant 5'-0" on Center	
VP	Viburnum prunifolium	Blackhaw Viburnum	28	2 gallon	Cont.	Full: Plant 8'-0" on Center	
VS	Viburnum sieboldii	Siebold Viburnum	15	2 gallon	Cont.	Full: Plant 8'-0" on Center	
VR	Viburnum rhy. "Allegheny"	Allegheny hybrid Viburnum	15	2 gallon	Cont.	Full: Plant 8'-0" on Center	
SEED							
SEED MIX		COVERAGE	SF	LBS PER ACRE	#LBS	NOTES	
New England Conservation Wildlife M		1750 sf per pound	10755	25 lbs per acre	7	Broadcast evenly	
Infiltration Basin Seed Mix		1250 sf per pound	2800	35 lbs per acre	3	Broadcast evenly	
New England Wildflower Seed Mix		1900 sf per pound	45590	23 lbs per acre	25	Broadcast evenly	

Landscape Elements, LLC
Landscape Architecture
Landscape Ecology
Cultural Landscape Preservation
200 Centerville Road, Suite 8, Pawtucket, RI 02860
T 401.921.2667 F 966.203.7696
www.landscapeelementsllc.com

PROJECT

BASF FORMER CIBA-GEIGY FACILITY

200 MILL STREET
CRANSTON, RHODE ISLAND

CLIENT

AEI CONSULTANTS

112 WATER STREET, 5TH FLOOR
BOSTON, MA 02109

DRAWING TITLE

LANDSCAPE PLAN

PROJECT NO.: 1701

DATE:

SCALE: 1" = 20'

DRAWN BY: LBD

CHECKED BY: SPC

DRAWING NUMBER

5

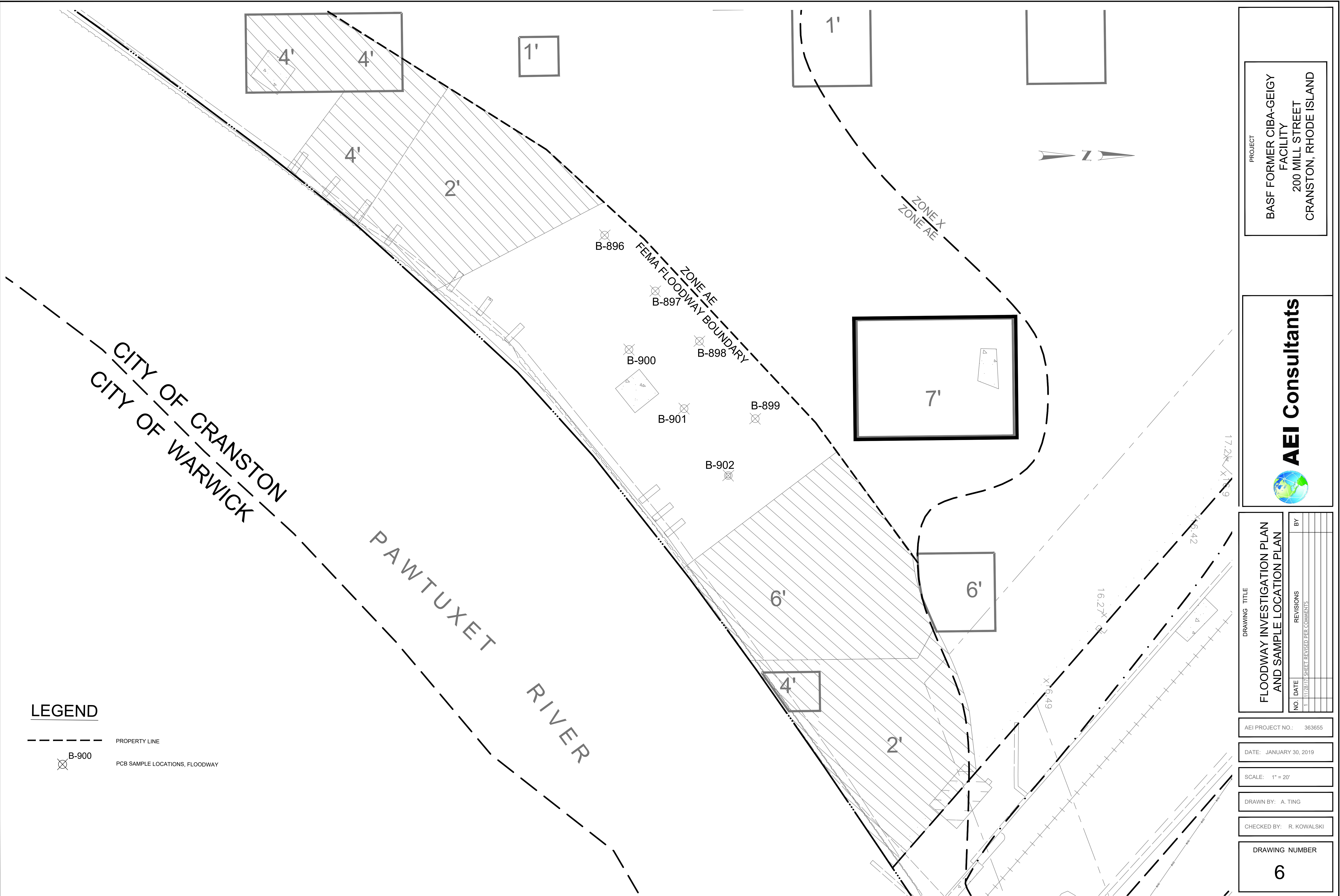
SHEET 1 OF 4

BY

NO.	DATE	REVISIONS
1	5/09/19	LANDSCAPE UPDATED TO REFLECT REVISED GRADING

AEI Consultants


Gordon R. Archibald, Inc.
Civil and Environmental Engineers
Pawtucket, Rhode Island



LEGEND

- PROPERTY LINE
- B-900 PCB SAMPLE LOCATIONS, FLOODWAY

PROJECT
BASF FORMER CIBA-GEIGY
FACILITY
200 MILL STREET
CRANSTON, RHODE ISLAND

**AEI Consultants**

DRAWING TITLE		REVISIONS		BY	
NO.	DATE				
1	11/28/17	SHEET REVISED PER COMMENTS			

AEI PROJECT NO.: 363655

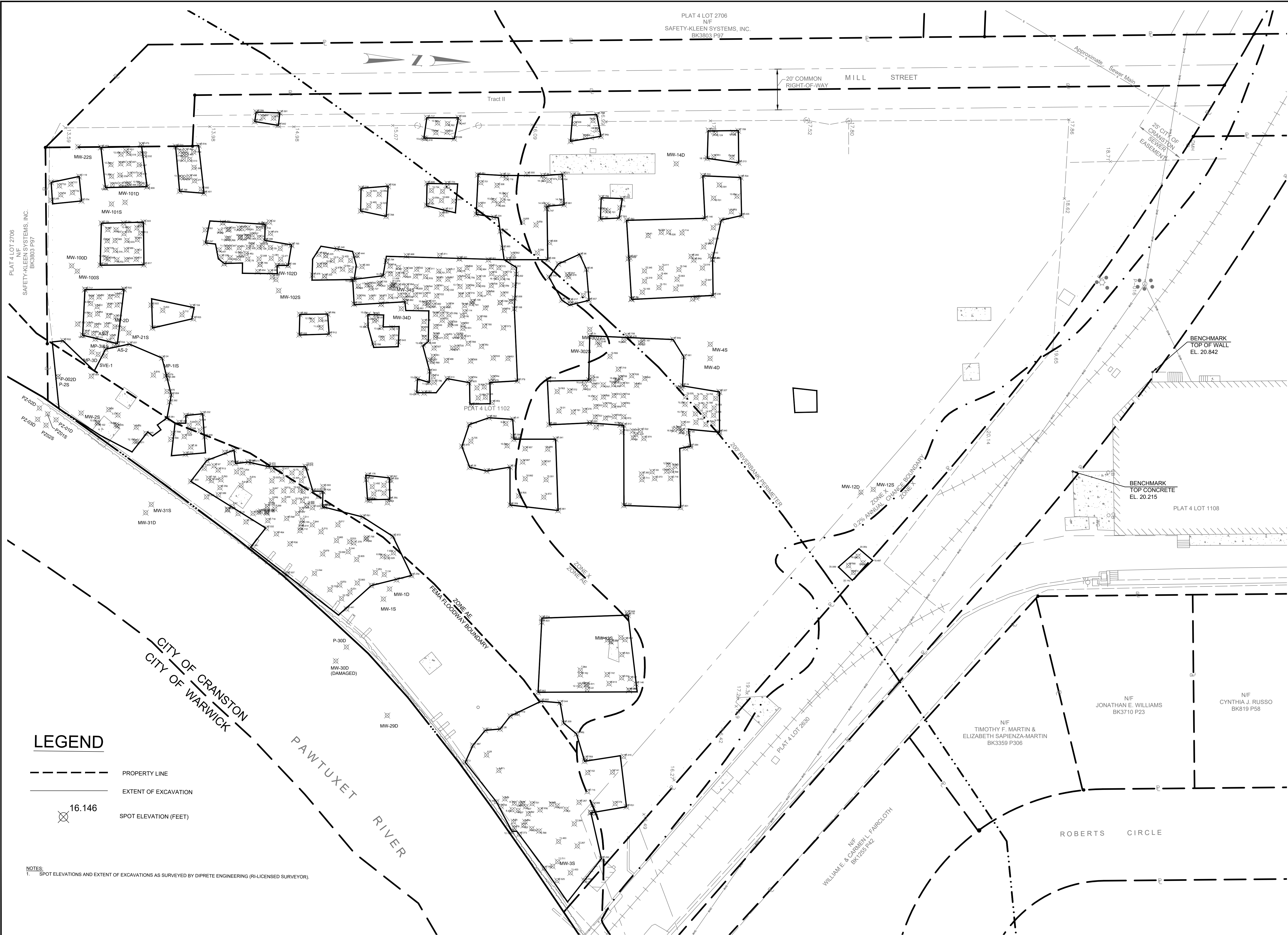
DATE: JANUARY 30, 2019

SCALE: 1" = 20'

DRAWN BY: A. TING

CHECKED BY: R. KOWALSKI

DRAWING NUMBER
6



PROJECT

**BASF FORMER CIBA-GEIGY
FACILITY**

200 MILL STREET

CRANSTON, RHODE ISLAND

AEI Consultants

DRAWING TITLE		REVISIONS		BY	
FINAL EXTENT OF EXCAVATION AREAS AND DEPTHS		NO.	DATE		
		1	11/28/17	SHEET REVISED PER COMMENTS	

AEI PROJECT NO.: 363655

DATE: JANUARY 30, 2019

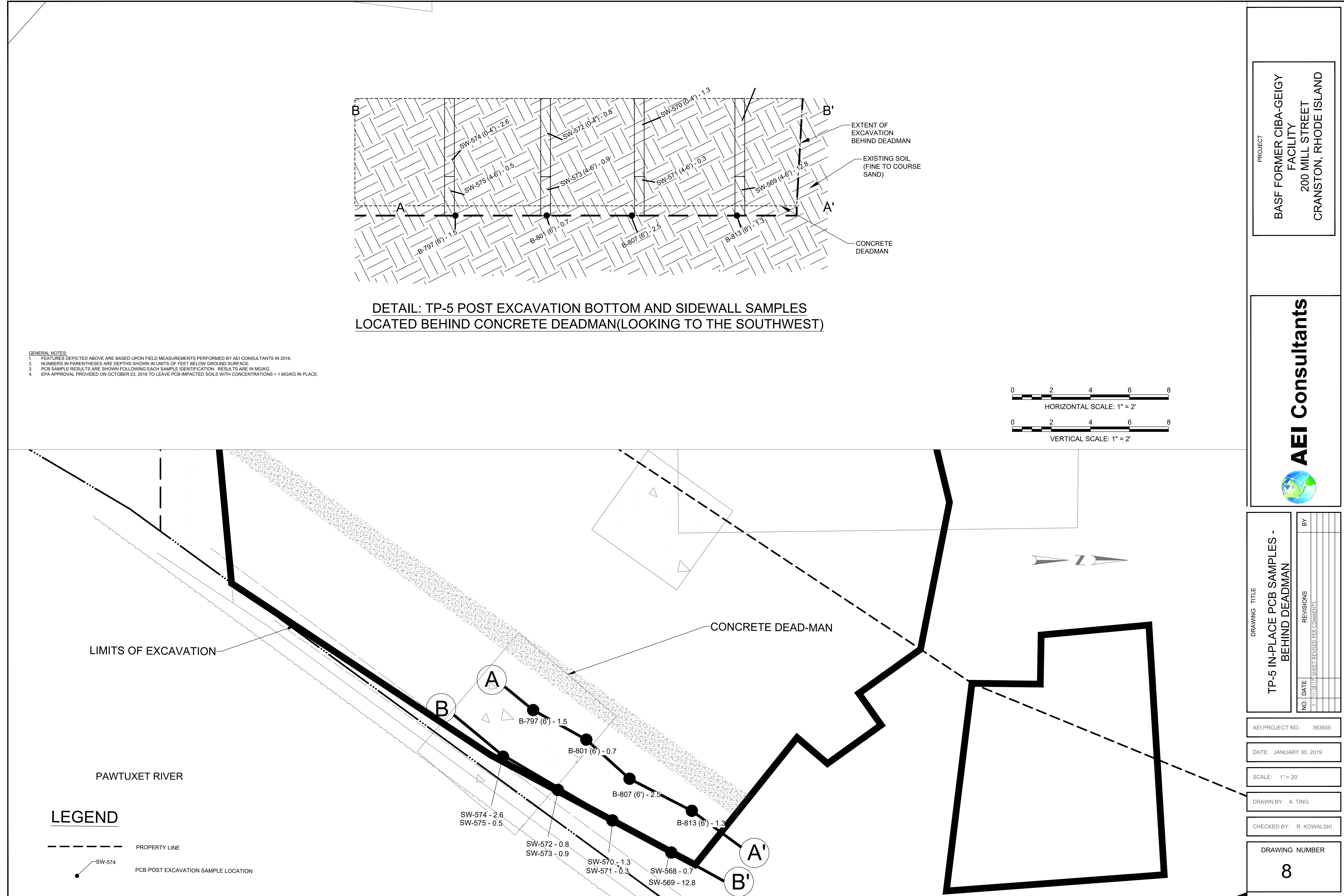
SCALE: 1" = 20'

DRAWN BY: A. TING

CHECKED BY: R. KOWALSKI

DRAWING NUMBER

7



GENERAL NOTES:
1. FEATURES DEPICTED ABOVE ARE BASED UPON FIELD MEASUREMENTS PERFORMED BY AEI CONSULTANTS IN 2018.
2. NUMBERS IN PARENTHESES ARE DEPTHS SHOWN IN UNITS OF FEET BELOW GROUND SURFACE.
3. PCB SAMPLE RESULTS ARE SHOWN FOLLOWING EACH SAMPLE IDENTIFICATION. RESULTS ARE IN MG/KG.
4. EPA APPROVAL PROVIDED ON OCTOBER 23, 2018 TO LEAVE PCB-IMPACTED SOILS WITH CONCENTRATIONS > 1 MG/KG IN PLACE.

PROJECT
BASF FORMER CIBA-GEIGY
FACILITY
200 MILL STREET
CRANSTON, RHODE ISLAND

AEI Consultants

DRAWING TITLE		TP-5 IN-PLACE PCB SAMPLES - BEHIND DEADMAN	
NO.		DATE	
1		11/28/17	
BY		REVISIONS	
		SHEET REVISED PER COMMENTS	

AEI PROJECT NO.: 363655

DATE: JANUARY 30, 2019

SCALE: 1" = 20'

DRAWN BY: A. TING

CHECKED BY: R. KOWALSKI

DRAWING NUMBER
8

C

C'

CONCRETE DEADMAN

EXISTING SOIL (FINE TO COURSE
SAND, TRANSITIONING TO SILTY SAND)

B-842-B (15') - 46.4

B-826-B (13') - 11

B-794-C (15') - 6.2

B-798-C (15') - 2.2

B-840-B (15') - 3.7

EXISTING SOIL (DENSE SILT AND CLAY)

DETAIL: TP-5 POST EXCAVATION BOTTOM SAMPLES > 1 MG/KG PCBs

- GENERAL NOTES:
1. FEATURES DEPICTED ABOVE ARE BASED UPON FIELD MEASUREMENTS PERFORMED BY AEI CONSULTANTS IN 2018.
 2. NUMBERS IN PARENTHESES ARE DEPTHS SHOWN IN UNITS OF FEET BELOW GROUND SURFACE.
 3. PCB SAMPLE RESULTS ARE SHOWN FOLLOWING EACH SAMPLE IDENTIFICATION. RESULTS ARE IN MG/KG.
 4. EPA APPROVAL PROVIDED ON OCTOBER 23, 2018 TO LEAVE PCB-IMPACTED SOILS WITH CONCENTRATIONS > 1 MG/KG IN PLACE.



HORIZONTAL SCALE: 1" = 2'



VERTICAL SCALE: 1" = 2'

PROJECT
BASF FORMER CIBA-GEIGY
FACILITY
200 MILL STREET
CRANSTON, RHODE ISLAND

AEI Consultants



DRAWING TITLE
TP-5 IN-PLACE PCB SAMPLES -
DEEP EXCAVATION AREA

NO.	DATE	REVISIONS	BY
1	11/28/17	SHEET REVISED PER COMMENTS	

AEI PROJECT NO.: 363655

DATE: JANUARY 30, 2019

SCALE: 1" = 20'

DRAWN BY: A. TING

CHECKED BY: R. KOWALSKI

DRAWING NUMBER

9

LIMITS OF EXCAVATION

PAWTUXET RIVER

LEGEND

- PROPERTY LINE
- B-842-B
PCB POST EXCAVATION SAMPLE LOCATION

CONCRETE DEAD-MAN

7

PROJECT



LOCATION MAP - SOUTHWEST S

REVISIONS

NO.	DATE

DATE:

DRAWN BY:

DRAWING NUMBER

SHEE: 05

BK3803 P97

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1001

B-104

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POST EXCAVATION SAMPLE LOCATION (EXCAVATED AND DISPOSED OFF-SITE)

B-4

GATE

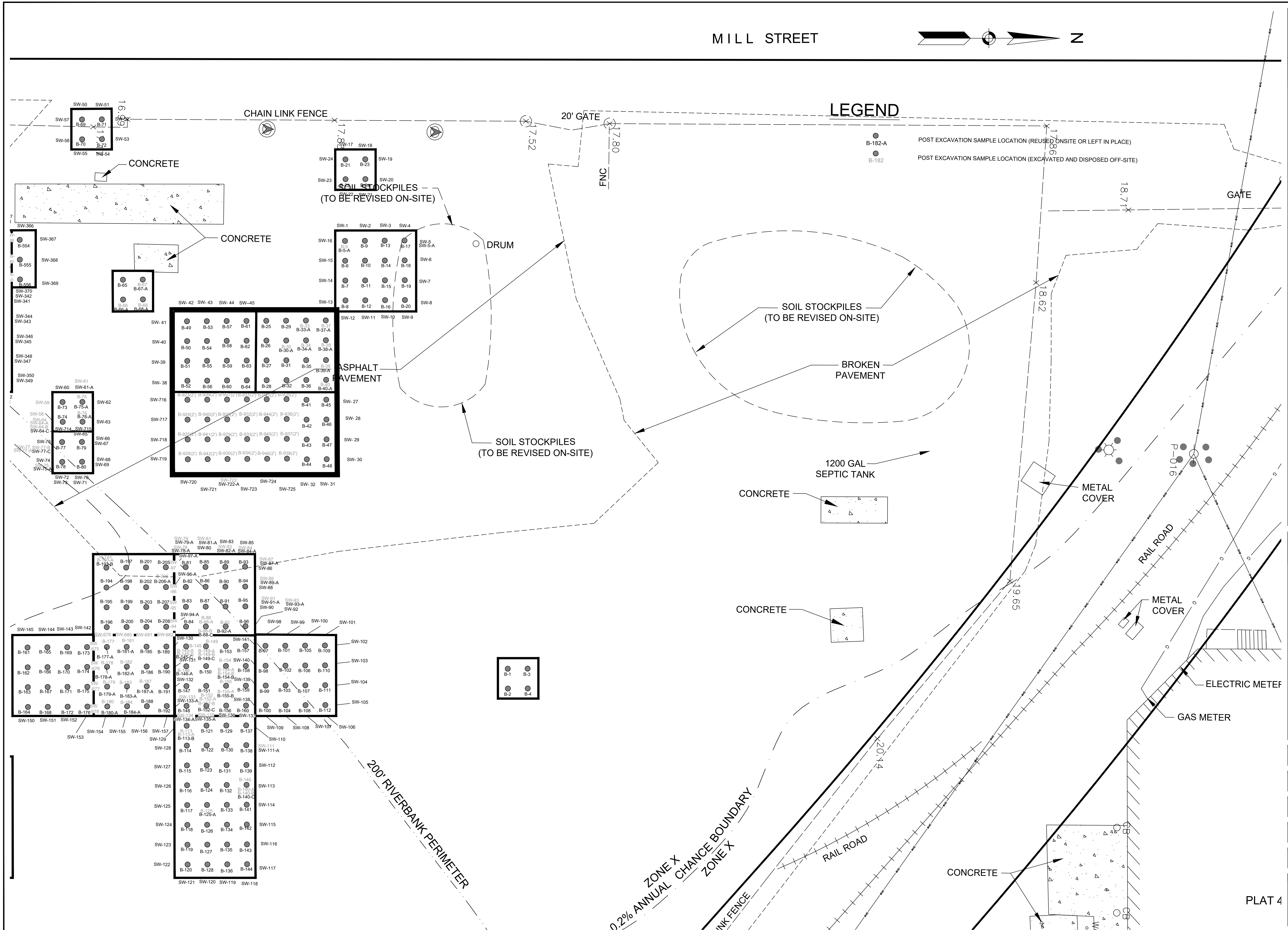
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B-638 B-640

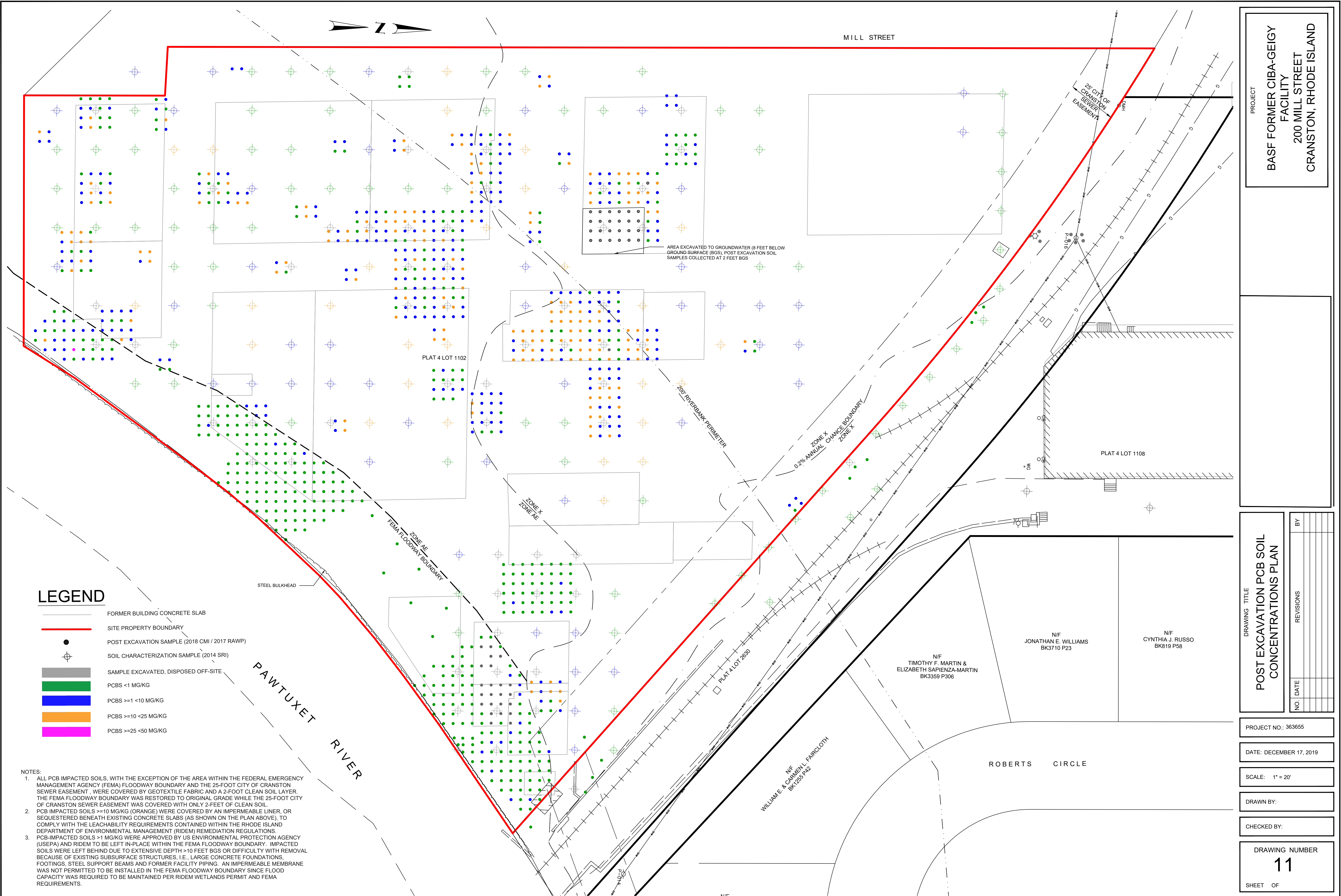
10a


AEI Consultants

NO.	DATE	REVISIONS	BY

DRAWING NUMBER
10c
SHEET OF





LEGEND

- FORMER BUILDING CONCRETE SLAB
- SITE PROPERTY BOUNDARY
- POST EXCAVATION SAMPLE (2018 CMI / 2017 RAWP)
- SOIL CHARACTERIZATION SAMPLE (2014 SRI)
- SAMPLE EXCAVATED, DISPOSED OFF-SITE
- PCBS <1 MG/KG
- PCBS >=1 <10 MG/KG
- PCBS >=10 <25 MG/KG
- PCBS >=25 <50 MG/KG

- NOTES:
- ALL PCB IMPACTED SOILS, WITH THE EXCEPTION OF THE AREA WITHIN THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOODWAY BOUNDARY AND THE 25-FOOT CITY OF CRANSTON SEWER EASEMENT, WERE COVERED BY GEOTEXTILE FABRIC AND A 2-FOOT CLEAN SOIL LAYER. THE FEMA FLOODWAY BOUNDARY WAS RESTORED TO ORIGINAL GRADE WHILE THE 25-FOOT CITY OF CRANSTON SEWER EASEMENT WAS COVERED WITH ONLY 2-FEET OF CLEAN SOIL.
 - PCB IMPACTED SOILS >=10 MG/KG (ORANGE) WERE COVERED BY AN IMPERMEABLE LINER, OR SEQUESTERED BENEATH EXISTING CONCRETE SLABS (AS SHOWN ON THE PLAN ABOVE), TO COMPLY WITH THE LEACHABILITY REQUIREMENTS CONTAINED WITHIN THE RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (RIDEM) REMEDIATION REGULATIONS.
 - PCB-IMPACTED SOILS >1 MG/KG WERE APPROVED BY US ENVIRONMENTAL PROTECTION AGENCY (USEPA) AND RIDEM TO BE LEFT IN-PLACE WITHIN THE FEMA FLOODWAY BOUNDARY. IMPACTED SOILS WERE LEFT BEHIND DUE TO EXTENSIVE DEPTH >10 FEET BGS OR DIFFICULTY WITH REMOVAL BECAUSE OF EXISTING SUBSURFACE STRUCTURES, I.E., LARGE CONCRETE FOUNDATIONS, FOOTINGS, STEEL SUPPORT BEAMS AND FORMER FACILITY PIPING. AN IMPERMEABLE MEMBRANE WAS NOT PERMITTED TO BE INSTALLED IN THE FEMA FLOODWAY BOUNDARY SINCE FLOOD CAPACITY WAS REQUIRED TO BE MAINTAINED PER RIDEM WETLANDS PERMIT AND FEMA REQUIREMENTS.

PROJECT
BASF FORMER CIBA-GEIGY
FACILITY
200 MILL STREET
CRANSTON, RHODE ISLAND

DRAWING TITLE		REVISIONS		BY	
POST EXCAVATION PCB SOIL CONCENTRATIONS PLAN					
NO.	DATE				

PROJECT NO.: 363655

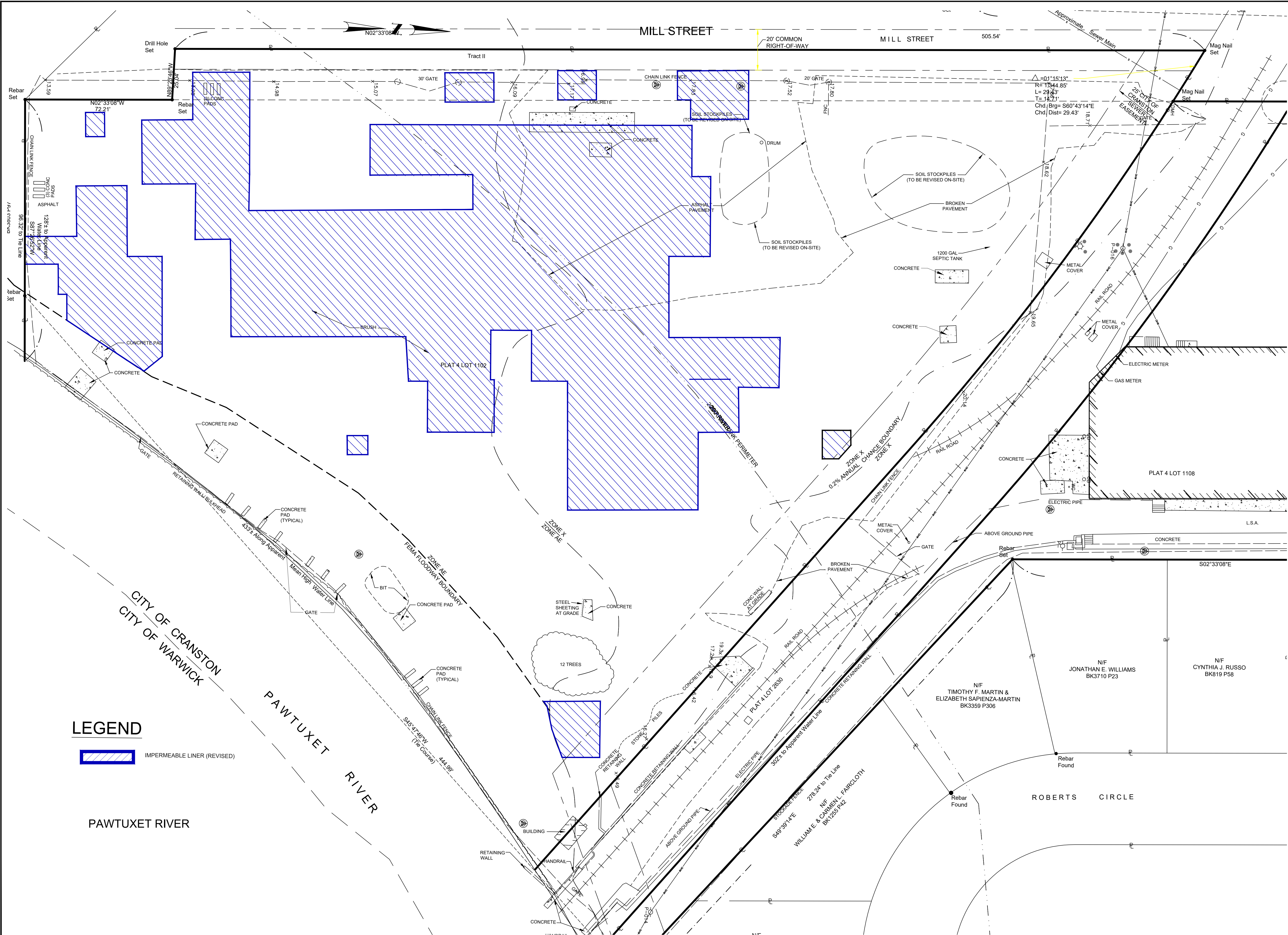
DATE: DECEMBER 17, 2019

SCALE: 1" = 20'

DRAWN BY:

CHECKED BY:

DRAWING NUMBER
11
SHEET OF



LEGEND

IMPERMEABLE LINER (REVISED)

PROJECT
BASF FORMER CIBA-GEIGY
FACILITY
200 MILL STREET
CRANSTON, RHODE ISLAND

DRAWING TITLE		REVISIONS		BY	
IMPERMEABLE COVER LOCATION PLAN					
NO.	DATE				

PROJECT NO.:

DATE:

SCALE: 1" = 20'

DRAWN BY:

CHECKED BY:

DRAWING NUMBER
12
SHEET OF

TABLES



Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	B-13E162*II-2	B-13F362*II-2	B-13F452*II-2	B-13O162*II-2	B-13O262*II-2
Depth	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.19J	0.96J	0.355U	0.28	0.175U
PCB 1254	0.09U	1.3J	6.1	0.55	0.4J
PCB 1260	0.09U	0.185U	0.355U	0.0345U	0.175U
TOTAL PCBs	0.19	2.26	6.1	0.83	0.4

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	B-13O362*II-2	SF-A13-A40(S)*IB-1	SS-AB21*II-1	SS-AB24*II-1	SS-AF26*II-1
Depth	0-2 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	3.6	0.55U	NT	0.23	0.37
PCB 1254	0.17U	25	25J	0.4	5.2
PCB 1260	0.17U	1.15U	NT	0.185U	0.085U
TOTAL PCBs	3.6	25	25	0.63	5.57

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SS-AG23*II-1	SS-B2*II-1	SS-B7*II-1	SS-C16*II-1	SS-C20*II-1	SF-A13-C27(S)*IB-2
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	2J	0.35	0.051	15J	0.12	1.15U
PCB 1254	19J	1.7	0.34	84J	0.6	75
PCB 1260	NT	0.019U	0.0185U	NT	0.0185U	2.25U
TOTAL PCBs	21	2.05	0.391	99	0.72	75

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SF-A13-C41(S)*IB-2	SS-D37*II-1	SS-E23*II-1	SS-E31*II-1	SS-E35*II-1
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.275U	5.5J	1.3	6.4J	5.2J
PCB 1254	14	64J	27	47J	58J
PCB 1260	0.55U	NT	0.375U	NT	NT
TOTAL PCBs	14	69.5	28.3	53.4	63.2

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SF-A13-E45(S)*IB-1	SS-F26*II-1	SS-G38*II-1	SF-A13-G47(S)*IB-2	SS-I43*II-1
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.55U	4.8J	5.3J	0.265U	2J
PCB 1254	51	74J	36J	6.5	10J
PCB 1260	1.05U	NT	NT	0.55U	NT
TOTAL PCBs	51	78.8	41.3	6.5	12

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SS-J11*II-1	SS-J21*II-1	SF-A13-J30(S)*IB-1	SF-A13-J35(S)*IB-1
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.175U	0.22J	0.55U	0.6U
PCB 1254	4.5	0.5	22	37
PCB 1260	0.175U	0.0175U	1.1U	1.15U
TOTAL PCBs	4.5	0.72	22	37

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SF-A13-J40(S)*IB-1	SF-A13-J40(S)*IB-2	SS-K14*II-1	SF-A13-L32(S)*IB-2
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.55U	1.15U	0.42	0.275U
PCB 1254	51	77	1.4	22
PCB 1260	1.1U	2.25U	0.095U	0.55U
TOTAL PCBs	51	77	1.82	22

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SF-A13-L37(S)*IB-2	SS-L48*II-1	SS-M22*II-1	SS-M42*II-1	SS-N13*II-1	SS-N29*II-1
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.055U	0.32	NT	28J	5.9J	3.4J
PCB 1254	4.7	0.64	37J	61J	26J	25J
PCB 1260	0.105U	0.0175U	NT	NT	NT	NT
TOTAL PCBs	4.7	0.96	37	89	31.9	28.4

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SS-N35*II-1	SF-A13-O10(S)*IB-1	SF-A13-O10(S)*IB-2	SS-O17*II-1
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.02J	0.055U	0.05U	6.1
PCB 1254	0.31J	4	5.3	11
PCB 1260	NT	0.11U	0.105U	0.185U
TOTAL PCBs	0.33	4	5.3	17.1

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SF-A13-Q25(S)*IB-1	SS-O44*II-1	SS-O7*II-1	SS-Q22*II-1	SF-A13-Q27(S)*IB-2
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.0055U	430J	0.017U	NT	0.55U
PCB 1254	1.4J	NT	0.46	35J	30
PCB 1260	0.011U	NT	0.017U	NT	1.15U
TOTAL PCBs	1.4	430	0.46	35	30

Notes:

X

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SS-Q38*II-1	SS-Q42*II-1	SS-R12*II-1	SS-R31*II-1	SS-S15*II-1	SS-S34*II-1
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.034U	0.085	0.0175U	0.017U	0.0175U	4.4J
PCB 1254	0.78	0.16	0.86	0.21	1.1	35J
PCB 1260	0.034U	0.018U	0.0175U	0.017U	0.0175U	NT
TOTAL PCBs	0.78	0.245	0.86	0.21	1.1	39.4

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SF-A13-T10(S)*IB-1	SS-T20*II-1	SS-U17*II-1	SS-U28*II-1	SS-U36*II-1	SS-V23*II-1
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.05U	NT	0.018U	0.175U	4.1J	0.018U
PCB 1254	2.7	58J	0.018U	5.6	31J	0.4
PCB 1260	0.105U	NT	0.018U	0.175U	NT	0.018U
TOTAL PCBs	2.7	58	ND	5.6	35.1	0.4

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	SS-W13*II-1	SS-W32*II-1	SS-Y15*II-1	SS-Y21*II-1	SS-Z28*II-1	B-2E1*II-1
Depth	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-0.5 ft bg	0-2 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.017U	0.021U	0.18U	0.65	0.09U	0.017U
PCB 1254	0.068J	0.055	7.6	6.8	1.8	0.15J
PCB 1260	0.017U	0.021U	0.18U	0.18U	0.09U	0.13
TOTAL PCBs	0.068	0.055	7.6	7.45	1.8	0.28

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	B-2F1*II-1	B-3E1*II-1	B-3F1*II-1	B-3I1*II-1	B-7B*IB-1	B-7B*IB-2	B-7D1*II-1
Depth	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.0175U	0.17U	0.17U	0.085U	0.05U	0.275U	0.335U
PCB 1254	0.19	2.3	5.3	4.8J	5.2	6	2.2J
PCB 1260	0.24	3.2	3	0.085U	0.105U	0.55U	6.1J
TOTAL PCBs	0.43	5.5	8.3	4.8	5.2	6	8.3

Notes:

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated

Table 1 - Summary of PCB Analytical Soil Results - 1995 RFI
BASF
200 Mill Street, Cranston, RI
AEI PN: 363655

Sample ID	B-7E1*II-1	B-7F1*II-1	B-7G1*II-1	B-7H1*II-1	B-8A*IB-1	B-8B*IB-1	B-8B*IB-2
Depth	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg	0-2 ft bg
PCBs (mg/kg)	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q	Results Q
PCB 1248	0.085U	0.017U	0.085U	0.175U	0.026U	0.265U	0.28U
PCB 1254	0.62	0.017U	2.2	4.2J	1.8	0.55U	12J
PCB 1260	0.83	0.017U	0.085U	0.175U	0.05U	0.55U	0.55U
TOTAL PCBs	1.45	ND	2.2	4.2	1.8	ND	12

Notes:

X

All results reported in mg/kg

Q = Qualifier

U = Non-detect

J = Estimated

Samples in grey have been excavated